JORDANSPRINGS

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Level 2, 88 Phillip Street

Parramatta NSW 2150

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13 JUL 2015
PENRITH CITY COUNCIL

Jordan Springs Village Oval
Construction Certificate

LANDSCAPE WORKS SPECIFICATION

prepared by

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Volume 3 of 3

JOR-0003
Revision 01
Construction Certificate
17th October 2014

Document Set ID: 6719198
Version: 1, Version Date: 13/07/2015

QUALITY CONTROL PLAN

REV	DATE	DESCRIPTION	CHECKED
01	17-10-14	Construction Certificate	JW-MW

1 COMMENTS

Please initial page to proceed with above changes or for approval with no additions.

Signature/s: _____ Dated: 17-10-14

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0171 GENERAL REQUIREMENTS

1 GENERAL

1.1 RESPONSIBILITIES

Design

Design by contractor: If the contractor provides design, use only appropriately qualified persons and conform to all statutory requirements.

Conflict with the documents: If it is believed that a conflict exists between statutory requirements and the documents, notify the contract administrator immediately and provide a recommendation to resolve the conflict.

1.2 PRECEDENCE

General

Worksections and referenced documents:

- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of the worksections override conflicting requirements of their referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- Site management
- Landscape walling and edging
- Landscape fences and barriers
- Landscape softworks
- Landscape planting
- Landscape procurement
- Landscape Establishment
- Landscape furniture and fixings
- Concrete combined
- Painting

Cross referencing styles

Within the text:

- Worksection titles are indicated by *Italicised* text.
- Subsection titles are indicated by **BOLD** text.
- Clause titles are indicated by **Bold** text.

1.4 REFERENCED DOCUMENTS

Contractual relationships

General: Responsibilities and duties of the principal, contractor and contract administrator are not altered by requirements in the documents referenced in this specification.

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Current editions
General: Use referenced documents which are the editions, with amendments, current 3 months before the closing date for tenders, except where other editions or amendments are required by statutory authorities.

1.5 INTERPRETATION

Abbreviations
General: For the purposes of this specification the following abbreviations apply:

- AS: Australian Standard.
- BCA: National Construction Code Series Volume One: Building Code of Australia Class 2 to 9 Buildings and Volume Two: Building Code of Australia Class 1 and Class 10 Buildings.
- MSDS: Material safety data sheets.
- NATA: National Association of Testing Authorities.
- NCC: National Construction Code.
- NZS: New Zealand Standard.
- PCA: National Construction Code Series Volume 3: Plumbing Code of Australia.
- PVC: Polyvinyl Chloride.
- PVC-U: Unplasticised Polyvinyl Chloride. Also known as UPVC.
- VOC: Volatile Organic Compound.
- WHS: Work Health and Safety.

Definitions
General: For the purposes of this specification, the following definitions apply:

- Attendance: Attendance, provide attendance and similar expressions mean give assistance for examination and testing.
- Contractor: Contractor has the same meaning as builder and is the person or organisation bound to carry out and complete the work under the contract.
- Contract administrator: Contract administrator has the same meaning as architect or superintendent and is the person appointed by the owner or principal under the contract.
- Default: Specified value, product or installation method which is to be provided unless otherwise documented.
- Design life: The period of time for which it is assumed, in the design, that an asset will be able to perform its intended purpose with only anticipated maintenance but no major repair or replacement being necessary.
- Documented: Documented, as documented and similar terms mean contained in the contract documents.
- Economic life: The period of time from the acquisition of an asset to when the asset, while still physically capable of fulfilling its function and with only anticipated maintenance, ceases to be the lowest cost alternative for satisfying that function.
- Electricity distributor: Any person or organisation that provides electricity from an electricity distribution system to one or more electrical installations. Includes distributor, supply authority, network operator, local network service provider, electricity retailer or electricity entity, as may be appropriate in the relevant jurisdiction.
- Fire hazard properties: To BCA A2.4.
- Geotechnical site investigation: The process of evaluating the geotechnical characteristics of the site in the context of existing or proposed construction.
- Give notice: Give notice, submit, advise, inform and similar expressions mean give notice (submit, advise, inform) in writing to the contract administrator.
- High level interface: Systems transfer information in a digital format using an open system interface.
- Hot-dip galvanized: Zinc coated to AS/NZS 4680 after fabrication with coating thickness and mass to AS/NZS 4680 Table 1.
- IP: IP, IP code, IP rating and similar expression have the same meaning as IP Code in AS 60529.

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- Local government authority: A body established for the purposes of local government by or under a law applying in a state or territory.
- Low level interface: Systems transfer information via terminals and voltage free contacts.
- Manufacturer's recommendations: Recommendations, instructions, requirements, specifications (and similar expressions) provided in written or other form by the manufacturer and/or supplier relating to the suitability, use, installation, storage and/or handling of a product.
- Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:
  . Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.
  . Ferrous open sections zinc coated by an in-line process: To AS/NZS 4791.
  . Ferrous hollow sections zinc coated by a continuous or specialised process: To AS/NZS 4792.
- Network Utility Operator: A person who undertakes the piped distribution of drinking water or natural gas for supply or is the operator of a sewerage system or a stormwater system.
- Obtain: Obtain, seek and similar expressions mean obtain (seek) in writing from the contract administrator.
- Practical completion or Defects free completion: The requirements for these stages of completion are defined in the relevant building contract for the project.
- Pipe: Includes pipe and tube.
- Principal: Principal has the same meaning as owner, client and proprietor and is the party to whom the contractor is legally bound to construct the works.
- Professional engineer: As defined by the BCA.
- Proprietary: Proprietary means identifiable by naming manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
- Provide: Provide and similar expressions mean supply and install and include development of the design beyond that documented.
- Readily accessible: To AS/NZS 3000.
- Record drawings: Record drawings has the same meaning as as-installed drawings, as-built drawings and work-as-executed drawings.
- Registered testing authority:
  . An organisation registered by the National Association of Testing Authorities (NATA) to test in the relevant field; or
  . An organisation outside Australia registered by an authority recognised by NATA through a mutual recognition agreement; or
  . An organisation recognised as being a Registered Testing Authority under legislation at the time the test was undertaken.
- Required: Means required by the documents, the local council or statutory authorities.
- If required: A conditional specification term for work which may be shown in the documents or is a legislative requirement.
- Samples: Includes samples, prototypes and sample panels.
- Statutory authority: A public sector entity created by a specific law of the Commonwealth State of Territory.
- Supply: Supply, furnish and similar expressions mean supply only.
- Tests:
  . Pre-completion tests: Tests carried out before completion tests.
    * Type tests: Tests carried out on an item identical with a production item, before delivery to the site.
    * Production tests: Tests carried out on a purchased item, before delivery to the site.
    * Progressive tests: Tests carried out during installation to demonstrate performance in according with this specification.
    * Site tests: Tests carried out on the site.
  . Completion tests: Tests carried out on completed installations or systems and fully resolved before the date for practical completion, to demonstrate that the installation or system, including components, controls and equipment, operates correctly, safely and efficiently, and meets performance and other requirements. The contract administrator may direct that completion tests be carried out after the date for practical completion.
- Tolerance: The permitted difference between the upper limit and the lower limit of dimension, value or quantity.
- Verification: Provision of evidence or proof that a performance requirement has been met or a default exists.

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1.6 CONTRACT DOCUMENTS

Services diagrammatic layouts

General: Layouts of service lines, plant and equipment shown on the drawings are diagrammatic only, except where figured dimensions are provided or calculable.

Before commencing work:

- Obtain measurements and other necessary information.
- Coordinate the design and installation in conjunction with all trades.
- Where there are common trenches co-ordinate with all trades.
- Adjust alignments to avoid design elements such as footings, tree pits and other services.

Levels

General: Spot levels take precedence over contour lines and ground profile lines.

Drawings and manuals for existing services

Warranty: No warranty is given as to the completeness or accuracy of drawings and/or manuals of existing services.

1.7 INSPECTION

Notice

Concealment: If notice of inspection is required in respect of parts of the works that are to be concealed, advise when the inspection can be made before concealment.

Tests: Give notice of the time and place of documented tests.

Minimum notice: As documented in the for inspections to be made and for witnessing of tests: 2 working days

Light level requirements: to AS/NZS 1680.2.4.

Attendance

General: Provide attendance for documented inspections and tests.

1.8 SUBMISSIONS

General

Submit to: Superintendent

Default timing: Make submissions at least 5 working days before ordering products or starting installation of the respective portion of the works.

Submission response times: Allow in the construction program for at least the following times:

- Shop drawings: 5 working days
- Samples and prototypes: 2 working days
- Manufacturers' or suppliers' recommendations: 2 working days
- Product data: 2 working days
- Product/design substitution or modification: 2 working days

Proposed products schedules: If major products are not specified as proprietary items, submit a schedule of those proposed for use within 3 weeks of site possession.

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Identification: Identify the project, contractor, subcontractor or supplier, manufacturer, applicable product, model number and options, as appropriate and include pertinent contract document references. Include service connection requirements and product certification.

Non-compliance: Identify proposals for non-compliance with project requirements, and characteristics which may be detrimental to successful performance of the completed work.

Errors: If a submission contains errors, make a new or amended submission as appropriate, indicating changes made since the previous submission.

Electronic copies file format: PDF

Transmission medium: PDF

Hard copy quantity: PDF

Authority approvals

Authorities' approvals: Submit documents showing approval by the authorities whose requirements apply to the work.

Correspondence: Submit copies of correspondence and notes of meetings with authorities whose requirements apply to the work.

Certification

General: Submit certification that the plant and equipment submitted meets all requirements of the contract documents.

Marking and labelling

General: Before marking and labelling submit:

- Samples of the proposed labels.
- A schedule showing, for each item or type of item:
  - A description of the item or type of item sufficient to identify it.
  - The proposed text of the marking or label
  - The proposed location of the marking or label.

Inspection and testing

General: Submit an inspection and testing plan which is consistent with the construction program. Include particulars of test stages and procedures.

Test reports: Submit written reports on nominated tests

Materials

Product certification: If products must conform to product certification schemes, submit evidence of conformance.

Product data: For proprietary equipment, submit the manufacturer's product data as follows:

- Technical specifications and drawings.
- Type-test reports.
- Performance and rating tables.
- Recommendations for installation and maintenance.

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Samples
Submission: Submit nominated samples.

Incorporation of samples: If it is intended to incorporate samples into the works, submit proposals. Incorporate samples in the works which have been endorsed for inclusion. Do not incorporate other samples.

Retention of samples: Keep endorsed samples in good condition on site, until the date of practical completion.

Shop drawings
General: Include dimensioned drawings showing details of the fabrication and installation of structural elements, building components, services and equipment, including relationship to building structure and other services, cable type and size, and marking details.

Diagrammatic layouts: Coordinate work shown diagrammatically in the contract documents, and submit dimensioned set-out drawings.

Record drawings: Submit all documented shop drawings amended to include changes made during the progress of the work and up to the end of the defects liability period.

Services coordination: Coordinate with other building and service elements. Show adjusted positions on the shop drawings.

Space requirements: Check space requirements of equipment and services indicated diagrammatically in the contract documents.

Submission medium - PDF

Checking: Make sure that the drawings have been checked before submission.

Tests
General: Submit an inspection and testing plan which is consistent with the construction program. Include particulars of test stages and procedures.

Test reports: Submit written reports on nominated tests.

2 PRODUCTS

2.1 GENERAL

Manufacturers' or suppliers' recommendations
General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in conformance with the current written recommendations and instructions of the manufacturer or supplier.

Proprietary items/systems/assemblies: Assemble, install or fix to substrate in conformance with the current written recommendations and instructions of the manufacturer or supplier.

Project modifications: Advise of activities that supplement, or are contrary to, manufacturers' or suppliers' written recommendations and instructions.

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Sealed containers
General: If materials or products are supplied by the manufacturer in closed or sealed containers or packages, bring the materials or products to point of use in the original containers or packages.

General

A preference for Australian or New Zealand goods.

Prohibited materials
Do not provide the following:

- Materials, exceeding the limits of those listed, in the Safe Work Australia Hazardous Substances Information System (HSIS).
- Materials that use chlorofluorocarbon (CFC) or hydro chlorofluorocarbon (HCFC) in the manufacturing process.

Substitutions
Identified proprietary items: Identification of a proprietary item does not necessarily imply exclusive preference for the item so identified, but indicates the necessary properties of the item.

Alternatives: If alternatives to the documented products, methods or systems are proposed, submit sufficient information to permit evaluation of the proposed alternatives, including the following:

- Evidence that the performance is equal to or greater than that specified.
- Evidence of conformity to a cited standard.
- Samples.
- Essential technical information, in English.
- Reasons for the proposed substitutions.
- Statement of the extent of revisions to the contract documents.
- Statement of the extent of revisions to the construction program.
- Statement of cost implications including costs outside the contract.
- Statement of consequent alterations to other parts of the works.

Availability: If the documented products or systems are unavailable within the time constraints of the construction program, submit evidence.

Criteria: If the substitution is for any reason other than unavailability, submit evidence that the substitution:

- Is of net enhanced value to the principal.
- Is consistent with the contract documents and is as effective as the identified item, detail or method.

2.2 TESTS

Attendance
General: Provide attendance on tests.

Testing authorities
General: Except for site tests, have tests carried out by a Registered testing authority and submit test reports.

- Reports: Submit copies of test reports, including certificates for type tests, showing the observations and results of tests and conformance or non-conformance with requirements.
- Site tests: Use instruments calibrated by authorities accredited by a Registered testing authority.

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2.3 MATERIALS AND COMPONENTS

Consistency
General: For each material or product use the same manufacturer or source and provide consistent type, size, quality and appearance.

Corrosion resistance
General: Conform to the following atmospheric corrosivity category as defined in AS/NZS 2312.

Galvanizing
Severe conditions: Galvanize mild steel components (including fasteners) to AS 1214 or AS/NZS 4680 as appropriate, if:

- Exposed to weather.
- Embedded in masonry.

3 EXECUTION

3.1 WARRANTIES

General
General: If a warranty is documented or if a manufacturer's standard warranty extends beyond the end of the defects liability period, name the principal as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment.

Commencement: Commence warranty periods at practical completion or at acceptance of installation, if acceptance is not concurrent with practical completion.

Approval of installer: If installation is not by manufacturer, and product warranty is conditional on the manufacturer's approval of the installer, submit the manufacturer's written approval of the installing firm.

3.2 RECORD DRAWINGS

General
General: Submit record drawings showing the following:

- Installed locations of building elements, services, plant and equipment.
- Off-the-grid dimensions and depth if applicable.
- Any provisions for the future.

Recording, format and submission
Progress recording: Keep one set of drawings on site at all times, expressly for the purpose of marking changes made during the progress of the works.

Drawing layout: Use the same borders and title block as the contract drawings.

Quantity and format: Conform to **SUBMISSIONS.**

Endorsement: Sign and date all record drawings.

Accuracy: If errors in, or omissions from, the record drawings are found, amend the drawings and re-issue in the quantity and format documented for **RECORD DRAWINGS**.

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Date for submission: Not later than 2 weeks after the date for practical completion.

Services record drawings
General: Submit record drawings of services to **General** and **Recording, format and submission** and the following:

- Extensions and/or changes to existing: If a drawing shows extensions and/or alterations to existing installations, include sufficient of the existing installation to make the drawing comprehensible without reference to drawings of the original installation.
- Detention: If on-site detention tanks or pondage are provided, include the volume required on the drawing and the permitted flow rate to the connected system.
- Domestic cold water or fire mains: Show the pressure available at the initial connection point and the pressure available at the most disadvantaged location on each major section of the works.
- Stormwater: If storm water pipes are shown, include the pipe size and pipe grade together with the maximum acceptable flow and the actual design flow.

Diagrams: Provide diagrammatic drawings of each system including the following:

- Controls.
- Piping including all valves and valve identification tags.
- Principal items of equipment.
- Single line wiring diagrams.
- Acoustic and thermal insulation.
- Access provisions.
- Fixings.
- Fixtures.
- Switchgear and controlgear assembly circuit schedules including electrical service characteristics, controls and communications.
- Charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

3.3 OPERATION AND MAINTENANCE MANUALS

General
General: Submit operation and maintenance manuals for the whole of the work.

Authors and compilers: Personnel experienced in the maintenance and operation of equipment and systems installed, and with editorial ability.

Referenced documents: If referenced documents or technical worksections require that manuals be submitted, include corresponding material in the operation and maintenance manuals.

Subdivision: By installation or system, depending on project size.

Contents
General: Include the following:

- Table of contents: For each volume. Title to match cover.
- Directory: Names, addresses, and telephone and facsimile numbers of principal consultant, subconsultants, contractor, subcontractors and names of responsible parties.
- Record drawings: Complete set of record drawings, full size.
- Drawings and technical data: As necessary for the efficient operation and maintenance of the installation. Include:
  . Switchgear and controlgear assembly circuit schedules including electrical service characteristics, controls and communications.

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. Charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

- Installation description: General description of the installation.
- Systems descriptions and performance: Technical description of the systems installed and mode of operation, presented in a clear and concise format readily understandable by the principal's staff. Identify function, normal operating characteristics, and limiting conditions.
- Systems performance: Technical description of the mode of operation of the systems installed.
- Baseline data: To AS 1851.
- Documentation to AS 1851 including the schedule of essential functionality and performance requirements.
- Equipment descriptions:
  . Name, address, email address and telephone and facsimile numbers of the manufacturer and supplier of items of equipment installed, together with catalogue list numbers.
  . Schedules (system by system) of equipment, stating locations, duties, performance figures and dates of manufacture. Provide a unique code number cross-referenced to the record and diagrammatic drawings and schedules, including spare parts schedule, for each item of equipment installed.
  . Manufacturers' technical literature for equipment installed, assembled specifically for the project, excluding irrelevant matter. Mark each product data sheet to clearly identify specific products and component parts used in the installation, and data applicable to the installation.
  . Supplements to product data to illustrate relations of component parts. Include typed text as necessary.
- Certificates:
  . Certificates from authorities.
  . Copies of manufacturers' warranties.
  . Product certification.
  . Test certificates for each service installation and all equipment.
  . Test reports
  . Test, balancing and commissioning reports.
  . Control system testing and commissioning results.
- 7 day record of all trends at commissioning.
- Operation procedures:
  . Manufacturers' technical literature as appropriate.
  . Safe starting up, running-in, operating and shutting down procedures for systems installed. Include logical step-by-step sequence of instructions for each procedure.
  . Control sequences and flow diagrams for systems installed.
  . Legend for colour-codes services.
  . Schedules of fixed and variable equipment settings established during commissioning and maintenance.
- Maintenance procedures:
  . Detailed recommendations for preventative maintenance and procedures, including schedule of maintenance work including frequency and manufacturers' recommended tests.
  . Manufacturer's technical literature as appropriate. Register with manufacturer as necessary. Retain copies delivered with equipment.
  . Safe trouble-shooting, disassembly, repair and reassembly, cleaning, alignment and adjustment, balancing and checking procedures. Provide logical step-by-step sequence of instructions for each procedure.
  . Schedule of spares recommended to be held on site, being those items subject to wear or deterioration and which may involve the principal in extended deliveries when replacements are required. Include complete nomenclature and model numbers, and local sources of supply.
  . Schedule of normal consumable items, local sources of supply ,and expected replacement intervals up to a running time of 40 000 hours. Include lubrication schedules for equipment.
  . Schedules for recording recommissioning data to enable changes in the system over time can be identified.
  . Instructions for use of tools and testing equipment.
  . Emergency procedures, including telephone numbers for emergency services, and procedures for fault finding.
  . Material safety data sheets (MSDS).

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. Instructions and schedules conforming to AS 1851, AS/NZS 3666.2, AS/NZS 3666.3 and AS/NZS 3666.4.

- Maintenance records:
  . Prototype periodic maintenance records conforming to AS 1851 prepared to include project specific details.
  . Prototype periodic maintenance and performance report to AS/NZS 3666.2, AS/NZS 3666.3 and AS/NZS 3666.4 as appropriate, prepared to include project specific details.
  . Submit, in binders which match the manuals, loose leaf log book pages designed for recording completion activities including operational and maintenance procedures, materials used, test results, comments for future maintenance actions and notes covering the condition of the installation. Include completed log book pages recording the operational and maintenance activities performed up to the time of practical completion.
  . Number of pages: The greater of 100 pages or enough pages for the maintenance period and a further 12 months.

Format – electronic copies
Printing: Except for drawings required in the **RECORD DRAWINGS** clause provide material that can be legibly printed on A4 size paper.

Scope: Provide the same material as documented for hardcopy in electronic format.

Quantity and format: Conform to **Submissions – electronic copies**.

Format – hard copy
General: A4 size loose leaf, in commercial quality, 4 ring binders with hard covers, each indexed, divided and titled. Include the following features:

- Cover: Identify each binder with typed or printed title *OPERATION AND MAINTENANCE MANUAL*, to spine. Identify title of project, volume number, volume subject matter, and date of issue.
- Dividers: Durable divider for each separate element, with typed description of system and major equipment components. Clearly print short titles under laminated plastic tabs.
- Drawings: Fold drawings to A4 size with title visible, insert in plastic sleeves (one per drawing) and accommodate them in the binders.
- Pagination: Number pages.
- Ring size: 50 mm maximum, with compressor bars.
- Text: Manufacturers' printed data, including associated diagrams, or typewritten, single-sided on bond paper, in clear concise English.

Number of copies: 3.

Date for submission
Date for draft submission: The earlier of the following:

- 2 weeks before the date for practical completion.
- Commencement of training on services equipment.

Date for final submission: Within 2 weeks after practical completion.

3.4 CLEANING

Final cleaning
General: Before the date for practical completion, clean throughout, including all exterior and interior surfaces except those totally and permanently concealed from view.

Labels: Remove all labels not required for maintenance.

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3.5 PERIODIC MAINTENANCE OF SERVICES

General

General: During the maintenance period, carry out periodic inspections and maintenance work as recommended by manufacturers of supplied equipment, and promptly rectify faults.

Emergencies: Attend emergency calls promptly.

Annual maintenance: Carry out recommended annual maintenance procedures before the end of the maintenance period.

Maintenance period: 12 months

Maintenance program

General: Submit details of maintenance procedures and program, 6 weeks before the date for practical completion. Indicate dates of service visits. State contact telephone numbers of service operators and describe arrangements for emergency calls.

Maintenance records

General: Record in binders provided with operation and maintenance manuals.

Referenced documents: If referenced documents or technical worksections require that log books or records be submitted, include this material in the maintenance records.

Service visits: Record comments on the functioning of the systems, work carried out, items requiring corrective action, adjustments made and name of service operator. On completion of the visit, obtain the signature of the principal's designated representative on the record of the work undertaken.

Site control

General: Report to the principal's designated representative on arriving at and before leaving the site.

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0221 SITE MANAGEMENT

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide site management, as documented.

Designated areas for protection: Refer to landscape "Site Survey" drawings for extent of vegetation to be retained and protected.

Incidental works
Generally: Undertake the following:

- Reinstatement: Reinstate undeveloped ground surfaces to the condition existing at the commencement of the contract.
- Minor trimming: As required to complete the works, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):

- *General requirements.*

1.3 INTERPRETATION

Definitions
General: For the purposes of this worksection the following definitions apply:

- Clearance authority: Any authority covering statutory requirements relating to the project and requiring clearances for work in that particular area.
- Clearances: A formal certificate, approval or condition issued by a statutory authority to allow work to be carried out in a particular area.
- Contamination of land: The presence of a substance in, on or under the land which is a designated hazardous material and/or is at a concentration above that which is normally found in that locality, such that there presents a risk of harm to human health or to the environment.
- Green and organic waste: Includes all food wastes, vegetative wastes from land clearing and pruning operations, biosolids produced from the treatment of liquid wastes, garden wastes and forestry waste (bark and saw dust) and paper and cardboard products.
- Environment: The physical factors of the surroundings of human beings including the land, waters, atmosphere, climate, sound, odours, tastes, the biological factors of animals and plants and the social factor of aesthetics.
- Environmental audits: A review of environment management practices, in particular the evaluation of a site for environmental liability.
- Environmental impact assessment: A method for predicting environmental impacts of a proposed development including minimising identified impacts.
- Environmental management plan (EMP): A plan describing the management of the environmental issues and considerations for the activity being undertaken. This applies to the design, construction and operation of the buildings and infrastructure.
- Pollution incident: An incident or set of circumstances during or as a consequence of which there is, or is likely to be a leak, spill or other escape of a substance as a result of which pollution has occurred, is occurring or is likely to occur.
- Weed: An invasive plant that degrades our natural areas, reduces the sustainability or affects the health of people and animals.
- Tree: A tree is defined a plant with a height greater than 3m and a trunk diameter greater than 50mm
- Dripline: The outside extent of the tree canopy outlined on the ground.

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- Rootzone: Area of roots around trees extending to the edge of the Primary rootzone.
- Primary rootzone: A radius extending 10x the trunk diameter measured at 1400mm above ground level.
- Critical rootzone: A radius extending 5x the trunk diameter measured at 1400mm above ground level.
- Soil: Site topsoil: Refer to Landscape Softworks Worksection

1.4 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:

- Enclosures to trees to be retained.
- Trees to be removed tagged and identify prior to removal.
- Trees requiring tree surgery identified prior to undertaking surgery
- Root pruning works to any trees
- Extent of site topsoil to be salvaged prior to salvage
- Proposed location of stockpiles, prior to stockpiling.

Hold points
The following hold points must be complied to:

- Proposed location of Protective fencing and tree protection in place prior to commencing any site works.
- Pathway alignments and extent of earthworks and pavements pegged or clearly identified on site prior to undertaking construction works.

1.5 MANAGEMENT AND CONTROL

Plans submitted by the contractor
Implementation: Approved management plans documented in **Submissions.**

Management and control measures
Implementation: Management and control measures documented in **Execution.**

Staff induction
All personnel working on this project must be inducted about Flora and Fauna where significant or sensitive. The staff induction should also include tree protection measures and the procedures for salvage and reuse of any site topsoil and excavated material. Submit staff induction procedure to the Contract Administrator for review.

1.6 SUBMISSIONS

Submissions program
Time for submissions: Within 7 days of the awarding of the contract and before any work is commenced on site.

Training program: Submit a program to familiarise staff regarding the site environmental management plan, environmentally sensitive areas and responsibilities.

Environmental management plan (EMP)
EMP: Submit an environmental management plan and include the following details:

- Assignment of responsibility for environmental controls.
- Conditions of approvals, licences and permits to meet statutory requirements.
- Details of potential environmental impacts and operational control measures for implementation including:
  - Heritage.
  - Preservation of visual values.
  - Protection of endangered species.

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. Preservation of habitat.
- Details of environmental protection for each activity.
- Locations of environmental controls and environmentally sensitive areas.
- Communication procedures.
- Emergency response procedures including response time.
- Environmental training plan and procedures.
- Environmental auditing program.
- Other items necessary to protect the surrounding environment.

Address the phases of activity, as appropriate:

- Before construction and site establishment.
- During construction.
- After construction, including rehabilitation activities and maintenance of erosion and sedimentation controls.

Preliminary environmental management plan: Submit with the tender documentation.

Completed environmental management plan: Submit before work commences on site.

Soil erosion and sediment control plan

Plan: Submit a soil erosion and sediment control plan refer to engineers drawings for details and include the following:

- Staging of operations and sequence of works.
- Diversion of upstream water around the site.
- Provision of temporary drains and catch drains.
- Application of diversion, dispersal and/or retention measures to concentrate flows to control and dissipate stormwater through the site without damage.
- Spreader banks or other structures to disperse concentrated runoff.
- Temporary grassing or other treatments such as contour ploughing or bunding to disturbed areas and long-term stockpiles.
- Restoration of disturbed areas in progress with the works.
- Use of mulch materials to protect disturbed or exposed areas where suitable.

Areas: Include all site areas and access and haulage tracks, borrow pits, stockpile and storage areas and compound areas.

Waste management plan

Plan: Submit a waste management plan and identify major waste streams that will be generated during the contract including:

- Green waste and organic waste.
- Construction waste, including:
  . Spoil.
  . Demolition waste.
  . Asphalt or bitumen.
  . Concrete
  . Metal.
  . Paint materials and empty containers.
  . Office waste.
  . Kitchen waste.
  . Sewage effluent.

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- For each waste stream indicate:
  . How and where the waste is to be re-used, recycled, stockpiled or disposed of.
- Indicate how the waste will be transported between the site and point of re-use, recycling, stockpiling, treating or disposal and who will be responsible.

Waste stream: Submit details of location, labelling and protection of separate skips for the identified waste stream.

Site preparation
Mulching: Submit details of provisions for mulching cleared vegetation.

2 EXECUTION

2.1 GENERAL

Community liaison
General: Notify residents about new or changed construction activities which will affect access to, or disrupt the use of, their properties.

Notice: 5 working days unless the work is of an urgent nature with safety implications.

Notification content:

- The nature of the work.
- The reason for it being undertaken.
- The expected duration.
- Changes to traffic arrangements and property access.
- The 24-hour contact number of the responsible representative.

Legislative requirements
Conditions of the Development Approval relevant to environment controls

Complaints
Report: Within 1 working day of receiving a complaint about any environmental issue, including pollution, submit a written report detailing the complaint and action taken.

Register: Keep a register of all environmental complaints and action taken.

Cultural heritage
Notice: Give notice if any item is encountered which is suspected to be an artefact of heritage value or any relic or material suspected of being of Aboriginal or early settlement origin.

Action: Stop construction work that might affect the item and protect the item from damage or disturbance.

2.2 CONTROL AND PROTECTION

Air quality control
General: Protect adjoining owners, residents and the public against dust, dirt and water nuisance and injury. Use dust screens and watering to reduce the dust nuisance.

Dewatering
General: Keep earthworks free of water. Provide and maintain slopes, crowns and drains on excavations and embankments to make sure free drainage. Place construction, including fill,

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masonry, concrete and services, on ground from which free water has been removed. Prevent water flow over freshly laid work.

Disposal: Dispose of water legally.

Dust control
Provide dust-proof screens, bulkheads and covers to protect existing finishes and the immediate environment from dust and debris.

Lighting of fires
Prohibition: Do not light fires.

Vegetation and fauna
Wild life protected: All native.

Trees to be removed: Inspect to establish if nesting native fauna are present. If present give notice.
Refer to **Trees To Be Removed.**

Pruning: To AS 4373.

Water quality
Wash out: Make sure that wash out does not enter waterways or stormwater drains.

Cross connection: Make sure that there are no cross connections between the stormwater and the public sewerage system.

2.3 TRUCK CONTAMINATION

Truck contamination precautions
Covers: Use tarpaulins to prevent the dropping of materials on public roads.

Washing: Wash the underside of all vehicles leaving the site as follows:

- Mud: Do not carry mud on to adjacent paved streets or other areas.
- Noxious plants: If noxious plants, as designated by the local authority, are present on the site ensure seeds are not carried on to adjacent paved streets or other areas.

Wheel wash/shaker bay
Facilities: Provide the following:

- Shaker area size: Minimum 3.5 x 12m
- Surface: Crushed concrete or rock of between 100 mm and 200 mm rough diameter.
- Services: High pressure hose water supply.
- Location: Site the shaker bay and provide berms as required to drain to grassed areas of the site and allow infiltration to the subsurface.

2.4 MANAGEMENT AND CONTROL PLAN IMPLEMENTATION

Approval
Approval authority: The superintendent

Implementation
General: Implement the following approved management and control plans:

- Environmental management control plan.

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- Soil erosion and sediment control plan.
- Air quality control plan.
- Waste management plan.
- Ground contamination plan.
- Weed management plan.

Reporting

General: Compile the environment management plan (EMP) reports regularly to report the progress in relation to:

- Performance against statutory requirements.
- Performance against the EMP and the EMP policy, ecologically sustainable development outcomes and targets.
- Summary of monitoring, inspection and audits.
- Summary of reports required to meet the statutory requirements.
- Summary of environmental emergencies, incidents, non-compliance and complaints.

2.5 TEMPORARY LANDSCAPE FENCING

Prior to placing temporary fencing or commencing construction the Contractor shall submit to the Superintendent for review a mark-up of landscape "Preliminaries" plans showing Contractor's proposed temporary fencing locations. Exact final locations shall be agreed on site.

Protective fencing type 1 – Self-supporting cyclone chain link fence

Temporary fencing: To AS 4687

Location: To secure entire site compound works area. Provide around any trees to be retained to enclose the root zones. Refer to Details.

Height: 1800-2000 mm.

Gate: Provide a suitable hinged gate with a gate latch and lock.

Wire: Ensure no loose wires or cut ends that could form a hazard to pedestrians.

Duration: Maintain temporary fencing in place and in good order till practical completion or as approved by the superintendent.

Protective fencing type 2 – Fluorescent webbing barrier

Location: Provide to delineate vegetation to be retained and protected. Provide to any temporary excavations or minor works areas and outside that enclosed by Protective Fencing Type 1.

Height: 1200 mm.

Maximum post spacing: 4000 mm.

Posts: Star picket.

Gate: Provide a suitable gate.

Wire: Top, intermediate and bottom rows of 3.2 mm plain galvanized steel wire. Thread wire through webbing. Ensure no loose wires or cut ends that could form a hazard to pedestrians.

Webbing: Fluorescent or orange plastic mesh.

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Removal: Maintain temporary fencing in place and in good order till practical completion or as approved by the superintendent.

2.6 TREE PROTECTION

General

Warning sign: Display a sign in a prominent position at each entrance to the site, warning that trees and plantings are to be protected during the contract. Remove on completion.

Lettering: Road sign type sans serif letters, 100 mm high to AS 4970 Appendix C.

Protection measures program: Before commencement of earthworks.

Standard

General: Comply with the recommendations of those parts of AS 4970 which are referenced in this worksection.

Trees to be retained

Extent: All trees NOT marked for removal.

Tree protection

Tree protection zone: To AS 4970 Section 3.

Tree protective measures: To AS 4970 Section 4.

- Placement of Tree Enclosures: Place enclosures beyond the rootzones of trees to be retained unless work is required to be undertaken within this zone. Where work is required to be undertaken within rootzone place enclosures to minimise damage to the tree and rootzone. Place enclosures a minimum distance of 1000mm from the tree. Provide root zone protection to the extent of the rootzone. Where work extends to the tree trunk, also provide timber planking trunk protection, refer to Landscape Details.
- Rootzone Protection: Rootzones outside Tree Enclosures are to be protected with timber planks, 50x200mm tied by chain or metal strip placed upon 25mm rubber matting. Where this will be trafficked by the general public a safe surface covering such as approved organic mulch or other approved material should be spread over the rootzone.

Monitoring and certification: To AS 4970 Section 5.

Work near trees

Harmful materials: Keep the area within the dripline free of sheds and paths, construction material and debris. Do not place bulk materials and harmful materials under or near trees. Do not place spoil from excavations within the primary rootzone of trees. Prevent wind-blown or washed materials such as cement, concrete dust, washed aggregate, concrete, mortar, plaster wash, oil, chemicals, solvents and paints from entering the primary rootzone of trees to be retained, existing garden bed zones or proposed excavated mass planting beds.

Damage: Prevent damage to tree bark. Do not attach stays, guys and the like to trees.

Work under trees: Do not remove topsoil from, or add topsoil to, the area within the dripline of the trees.

Alignment set out: Pathways, structures, service trenching alignments and extent of earthworks and pavements are to be pegged or clearly identified on site prior to site review for impact upon vegetation to be protected.

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Excavation: If excavation is required near trees to be retained, give notice and obtain instructions. Open up excavations under tree canopies for as short a period as possible.

All excavation within the primary rootzone of trees to be retained to be undertaken using hand methods to locate and expose any roots on the line of excavation.

Hand methods: Use hand methods to locate, expose roots on the line of excavation such that the root systems are preserved intact and undamaged to allow inspection and instruction from the superintendent before continuation of site works.

Roots: Do not cut tree roots exceeding 50 mm diameter without approval from the superintendent. Where it is necessary to cut tree roots less than 50mm diameter, use means such that the cutting does not unduly disturb the remaining root system. Immediately after cutting, water the tree and apply a liquid rooting hormone to stimulate the growth of new roots.

Root hormone treatment: Apply root hormone solution directly to cut roots if they are exposed during excavation. Alternatively, if the construction method does not expose roots, drench the zone at the surface with the root hormone solution. Apply the solution at the rates and intervals recommended by the manufacturer.

Root protection: Where the exposed soil face containing tree roots is to remain exposed for more than 24 hours and up to 1 week, apply temporary protection to prevent root desiccation. Backfill peat or compost and maintain adequate soil moisture during the period. Cover the exposed soil face with underfelt/hessian and keep moist until the face can be backfilled. Avoid collapse of soil from around exposed tree roots. Install temporary stabilisation or root curtains as required. For periods exceeding 1 week, line the face of the trench adjacent to the tree with approved temporary root barrier material and backfill as specified in Backfilling, ensuring the root barrier remains vertical.

Backfilling: Backfill to excavations around tree roots with site improved topsoil type A or imported topsoil type A. Place the backfill in layers of 300 mm maximum depth and compacted to a dry density similar to that of the original or surrounding soil. Do not backfill around tree trunks to a height greater than the original ground surface. Immediately after backfilling, thoroughly water the root zone surrounding the tree.

Compacted ground: Do not compact the ground or use skid-steel vehicles under the tree dripline Use appropriate machinery to minimise damage and compaction within the primary rootzone. Skid steer vehicles must not be operated within the primary rootzone. If compaction occurs, give notice and obtain instructions before proceeding with any decompaction works. Decompact the soil by soil coring, water jetting or by using a pneumatic device equivalent to a 'terra lifter' and as approved. Use timber plank rootzone protection to minimise compaction within the primary rootzone area.

Compaction protection: Protect areas adjacent the tree dripline. Submit proposals for an elevated platform to suit the proposed earthworks machinery.

Watering: Water trees as necessary, including where roots are exposed at ambient temperature more than 35°C.

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Mulching: Spread 100 mm thick organic mulch to the whole of the area covered by the drip line of all protected trees.

2.7 EXISTING SERVICES

Location

Requirement: Before commencing earthworks, locate and mark existing underground services in the areas which will be affected by the earthworks operations including clearing, excavating and trenching.

Utility services: Contact DIAL BEFORE YOU DIG to identify location of underground utility services pipes and cables.

Excavation

General: Do not excavate by machine within 1 m of existing underground services.

2.8 TREES TO BE REMOVED

Marking: Mark trees and shrubs to be removed using suitable non-injurious, easily visible and removable means of identification.

Tags: 100 x 50 mm zincanneal or heavy duty plastic tags, painted yellow and lettered with the tree number. Secure tags to trees using loose galvanized steel wire bands.

Notice: Give notice and seek permission prior to removing any trees.

Fauna inspection: Inspect trees immediately prior to removal to ensure there are no fauna present. If fauna present, cease removal operations, advise the Contract administrator and arrange for the safe collection of the fauna using non-injurious techniques and delivery to an appropriate equivalent habitat or wildlife centre.

Removal: Only remove trees once fauna inspection process is completed. Remove trees in a safe and approved manner and in accordance with method statement and industry standards/protocols. No damage to be caused to any protected trees or vegetation or infrastructure that is to be retained. Cut down trees to ground level and remove to an on-site stockpile for inspection and chipping. Undertake work to the requirements of ***Tree Maintenance.***

Inspection: Re-inspect stockpiled material for the presence of any fauna. If fauna present advise the superintendent and arrange for safe collection using non-injurious techniques and delivery to an appropriate equivalent habitat or wildlife centre.

Chipping: Following fauna inspection, chip stockpiled removed trees and cleared vegetation to reduce to pieces not larger than 75 x 50 x 15mm and stockpile on site for re-use.

Material not permitted: Leaf matter and tree loppings from privet, camphor laurel, coral tree, poplar, willow, and noxious weeds.

2.9 SITE CLEARING

Extent

General: Clear only the following site areas:

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- Areas to be occupied by works such as structures, paving, excavation, regrading and landscaping.
- Other areas designated to be cleared.

Contractor's site areas: If not included within the areas documented above, clear generally only to the extent necessary for the performance of the works.

Clearing and grubbing

Clearing: Remove everything on or above the site surface, including rubbish, scrap, grass, vegetable matter and organic debris, scrub, trees, timber, stumps, boulders and rubble.

Grubbing: Grub out stumps and roots over 75 mm diameter to a minimum depth of 500 mm below subgrade under buildings, embankments or paving, or 300 mm below finished surface in unpaved areas. Backfill holes remaining after grubbing with sand material to prevent ponding of water. Compact the material to the relative density of the existing adjacent ground material.

Old works: Remove old works, including slabs, foundations, pavings, drains and access chambers covers found on the surface.

Cleared vegetation: Refer to ***Trees to be Removed*** and ***Disposal of materials***

Topsoil to be stripped and salvaged: Refer to SESL report for specific requirements.

2.10 TREE MAINTENANCE

General

Notice: Give notice before commencing tree surgery or maintenance.

Work on trees: If it is necessary to perform any work on trees to be retained, give notice.

Contractor's Project Arborist: Employ suitably qualified arborist, (to be referred to as the Project Arborist) to carry out tree surgery work where required in a safe and progressive manner and undertake or supervise all tree protection removal and tree management operations during the course of the works.

Project Arborist qualifications: A qualified arborist is defined as having as a minimum, the TAFE Advanced Certificate, Urban Horticulture, including the subject arboriculture and/ or associate diploma Applied Science, Park Management or their equivalent. The Project Arborist shall have a minimum of five years experience in arboriculture including demonstrated experience in tree diagnosis, tree surgery and hazard assessment. Provide details to the Contract administrator for approval.

Extent: Contractors Project Arborist to determine the requirement and extent of tree surgery on site in liaison with the Contract administrator and Landscape Architect such that all parties have a clear understanding of the scope of works. The Project Arborist is to provide a tree surgery report including:

- Clear and accurate identification of all trees requiring surgery.
- Discussion of methods used to determine proposed works.
- Number each tree and provide description of the extent of surgery required and the methods for proposed works.
- Photographic record of all works.

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On call visits by Project Arborist: Carry out on call visits when requested by the Superintendent to provide the following services:

- An assessment of the condition of the trees, inspection of any works affecting the trees such as service trenching or to carry out root pruning/branch pruning/tying back of branches.
- Minutes and/or written instructions, or a short report of the assessment and recommendations.

Pruning requirements: Carry out all pruning in conformance with AS 4373 and Work Health and Safety Act and the relevant industry code of practice by a fully qualified and experienced arborist. Carry out all required works in a safe and progressive manner.

Execution

Repair: Repair trees damaged during the work as determined by the Project Arborist based on the Project Arborist's assessment and recommendation. Where branches have to be pruned, work to be carried out by the Project Arborist only.

Operations: Remove dead and decayed wood or limbs that have been broken. Make all cuts at branch collars. If trees show signs of deterioration after the work has been done, carry out a program of soil amelioration such as soil aeration, irrigation or incorporation of organic material. Continue this program until the end of the plant establishment period.

- Remove a minimum amount of foliage to achieve the required pruning. When removing a live branch, at all times make cuts just outside of the branch collar or at approximately the same angle as the branch bark ridge where no collar exists. Do not damage the collar or branch bark ridge or leave a protruding stub.
- Remove dead trees within stands of existing vegetation to be retained should not be treated.
- Minimise wounds to live tissue. When removing deadwood, make the cut just outside of the collar avoiding damage to the live cambium tissue. Cut into the dead tissue only but do not leave a stub. Avoid cuts close to the sites of existing decayed tissue to reduce the risk of spreading pathogens.

Carry out all pruning without the use of climbing spurs or other tools that might injure the bark or conductive tissue of the tree. Do not apply dressings or paints to wounds.

Root pruning: Do not unduly disturb the remaining root system. Refer to ***Work near trees.***

Wetting and new root stimulation: Form a water collecting basin and apply a rooting hormone and wetting agent to the rootball.

Precautions: Avoid damage to trees being treated or to nearby trees and surroundings. Do not use trees as anchors for winching operations or bracing. Provide bracing as necessary before cutting to prevent uncontrolled breakages and damage to surroundings. Prevent damage to tree bark. Do not attach stays, guys and the like to trees.

Canopy protection: Protect any exposed or overhanging canopy from damage by scaffolding, machinery or vehicles or construction plant, or temporary drainage or access. Where overhanging canopy needs to be trimmed provide a tree surgery schedule and obtain instructions prior to commencing work.

Branch tying: Where temporary construction or plant access is required utilise branch tying where practical in lieu of lopping or tree surgery. Project Arborist to tie branches affected by excavation machinery out of the way as required. Tie back branches using non-injurious techniques. Branches are not to be stressed beyond their natural limits of flexibility. Provide protective packing such as

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hessian, rubber, or other suitable material around branches to prevent abrasion or other damage from rope or slings. Remove ties and allow branches to return to their natural growth position as soon as possible after completion of the specified work.

Failure: If repair work is impracticable, or is attempted and is rejected, remove the tree and root system and make good.

Damages: Where trees to be retained are removed or are damaged to an extent that requires removal, pay damages. Trees are to be valued according to DR 99307: Amenity Trees guide to valuation, unless a value is nominated.

2.11 DISPOSAL OF MATERIALS

Disposal

Spoil: Remove cleared and grubbed material from the site and dispose of legally.

Mulch

Seed free aerial vegetative matter: Put through a chipper. Reduce to pieces not larger than 75 x 50 x 15 mm and stockpile for re-use as mulch.

Material not permitted: Leaf matter and tree loppings from privet, camphor laurel, coral tree, poplar, willow and noxious weeds.

2.12 COMPLETION

Clean up

Progressive cleaning: Keep the work under the contract clean and tidy as it proceeds and regularly remove from the site rubbish and surplus material arising from the execution of the work including any work performed during the defects liability period or the plant establishment period.

Removal of plant: Within fourteen days of the date of practical completion, remove temporary works, construction plant, buildings, workshops and equipment not forming part of the works, except what is required for work during the defects liability period or the plant establishment period. Remove these on completion.

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0250 LANDSCAPE – SOFTWORKS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide plants as documented that have been grown to a standard that allows them to establish rapidly and grow to maturity.

Maintenance: Encourage and maintain healthy growth for the duration of the contract.

Program: Provide a suitable irrigation, pruning, fertiliser and monitoring program for all plant materials held by the supplier. Take any other precautions required to safeguard the health and well-being of all plant materials before and including their delivery to site.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements.*
- *Landscape Soils*

1.3 INSPECTION

Notice – on site

Inspection: Give notice so that inspection may be made of the following:

- Setting out completed.
- Topsoil spread before planting.
- Grassing bed prepared before turfing, seeding, or temporary grassing.
- Grassing or turfing completed.
- Plant material set out before planting.
- Planting, staking and tying completed.
- Completion of planting establishment work.
- Inspections during the planting establishment period, which NATSPEC assumes to be the same as the defects liability period (also Maintenance Period), may require the presence of the contractor. If this is the case, give sufficient notice.

Hold points

Inspection: Give notice so inspection may be made of the following:

- Tree Planting holes excavated and prepared including any sub soil drainage prior to planting.

1.4 SUBMISSIONS

Materials

Supplier's data: Submit supplier's data including the following:

- Material source of supply for topsoil, filling, stone and filter fabrics.

Compost: Submit a certificate of proof of compost pH value.

Replacement plants

Species: Provide written certification that all plant material is true to the required species and type.

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Samples
General: Submit representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

Bulk materials: Submit a 5 kg sample of each type specified. Submit bulk material samples, with required test results, at least 5 working days before bulk deliveries.

Suppliers
Statements: Submit statements from suppliers, giving the following, where applicable:

- Particulars of the supplier's experience in the required type of work.
- Production capacity for material of the required type and quantity.
- Lead times for delivery of the material to the site.

2 PRODUCTS

2.1 GRASS

Seed
Mixtures: Provide seed mixtures which are thoroughly pre-mixed with a bulking material such as safflower meal. Deliver to the site in bags marked to show weight, seed species and supplier's name. Provide fresh, clean, dry, mould free, uncoated and viable new seed.

Purity (minimum): 98%.

Germination viability (minimum): 86%.

Age (maximum) from date of harvest: 2 years.

Turf
Supplier: Obtain turf from a specialist grower of cultivated turf.

Quality: Provide turf of even thickness, free from weeds and other foreign matter.

2.2 FERTILISER

Fertiliser
General: Provide proprietary fertilisers, delivered to the site in sealed bags marked to show manufacturer or vendor, weight, fertiliser type, N:P:K ratio, recommended uses and application rates to Landscape - Soils

2.3 PLANTS

Supply
Client supplied plants: The contractor is to inspect the plants prior to incorporation into the works. If plants are not considered acceptable by the contractor consult with superintendent. Contractor to allow for delivery to site.

Refer to *Landscape – plant procurement*

Labelling
General: Clearly label individual plants and batches.

- Label type: To withstand transit without erasure or misplacement.

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- Label frequency: one plant of each species per bed.

Storage
Timing: Deliver plant material to the site on a day to day basis, and plant immediately after delivery.

Health and vigour
Health: Supply plants with foliage size, texture and colour at time of delivery consistent with the size, texture and colour shown in healthy specimens of the nominated species.

Vigour: Supply plants with extension growth consistent with that exhibited in vigorous specimens of the species nominated.

Damage: Supply plants free from damage and from restricted habit due to growth in nursery rows.

Stress: Supply plants free from stress resulting from inadequate watering, excessive shade or excessive sunlight experienced at any time during their development.

Site environment: Supply plants that have been grown and hardened off to suit the conditions that could reasonably be anticipated to exist on site at the time of delivery.

Root development
Containers: Grow plants in their final containers for the following periods:

- Plants < 25 L size: > 6 weeks.
- Plants > 25 L size: > 12 weeks.

Freedom from pests and disease
Pests and disease: Supply plants with foliage free from attack by pests or disease.

Native species with a history of attack by native pests: Restrict plant supply to those with evidence of previous attack to < 15% of the foliage and ensure absence of actively feeding insects.

Root system
Requirement: Supply plant material with the root system:

- Well proportioned in relation to the size of the plant material.
- Conducive to successful transplantation.
- Free of any indication of having been restricted or damaged.

Root inspection: If inspection is by the removal of soil test as follows:

- For > 100 samples: Inspect 1%.
- For < 100 samples: Inspect 1 sample.

Sample plants: Replace.

Rejection: Root bound stock.

2.4 MULCH

General: Provide mulch which is free of deleterious and extraneous matter such as soil, weeds and sticks. Do not include fine mulch.

Standard:

- Particle size, physical and chemical contaminants: To AS 4454.

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- pH, electrical conductivity, ammonium, chlorine and other nutrients: To AS 3743.

Organic mulches: Free of stones.

Mulch material: Brush chippings and leaf litter recovered from site clearing, if available. Refer to ***Disposal of Materials.***

Organic Mulch (Paving Type 6)
Brush chippings and leaf litter: Vegetative material processed through a chipper to pieces not larger than 75 x 50 x 15 mm.

Material permitted: Leaf matter and tree loppings from Eucalyptus or Tristania.

Material not permitted: Leaf matter and tree loppings from privet, camphor laurel, coral tree, poplar, willow, and noxious weeds.

Product Code: MLL

Supplier: Australian Native Landscapes or approved equivalent.

Softfall Mulch (Paving Type 5)
New playground mulch shall be equal or similar to "A" Pine bark 'mini nuggets'. The mulch shall be pine graded to 15mm to AS/NZS 4422 (1996). Notwithstanding the requirements of AS4422, no timber chips or flakes longer than 15mm shall be mixed into mulch, and mulch shall be free of soil, vegetative matter and any deleterious contaminants.

Ensure that when mulch is ordered, that the bulking out/fluffing up percentage is allowed for in the quantities that are ordered. For example, if the mulch fluffs up 30% during delivery, an additional 30% of mulch will need to be ordered. Variations for this percentage will not be considered for mulch.

A certificate of compliance to the Standards shall be provided to the Superintendent.

3 EXECUTION

3.1 PREPARATION

Weed eradication
Herbicide: Eradicate weeds using environmentally acceptable methods, such as a non-residual glyphosate herbicide in any of its registered formulae, at the recommended maximum rate.

Manual weeding: Regularly remove, by hand, rubbish and weed growth throughout grassed, planted and mulched areas. Remove weed growth from an area 750 mm diameter around the base of the trees in grassed areas. Continue eradication throughout the course of the works and during the planting establishment period.

Vegetative spoil
Remove vegetative spoil from site. Do not burn.

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3.2 GRASS SEEDING

Preparation

General: Prepare the areas to be sown. Spread the fertiliser evenly over the cultivated bed within 48 hours before sowing, and rake lightly into the surface. If a prepared area becomes compacted from any cause before sowing can begin, rework the ground surface before sowing.

Sowing

Conditions: Do not sow if frost is likely before the plant has reached an established state, or in periods of extreme heat, cold or wet, or when wind velocities exceed 8 km/h. Provide even distribution. Lightly rake the surface to cover the seed.

Rolling

General: Roll the seed bed immediately after sowing.

Roller weight (maximum):

- Clay and packing (heavy) soils: 90 kg/m width.
- Sandy and light soils: 300 kg/m width.

Watering

Before germination: Water the seeded area with a fine spray until the topsoil is moistened to its full depth. Continue watering until germination to keep the surface damp and the topsoil moist but not waterlogged.

After germination: Water to maintain a healthy condition, progressively hardened off to the natural climatic conditions.

Germination

General: Maintain sown areas until the attainment of a dense continuous sward of healthy grass over the whole of the seeded area, evenly green and of a consistent height.

Reseeding: If germination has not been attained within one month, reseed the sown areas.

Weeding

Removal: Remove weeds that occur in sown areas.

Spraying: Where necessary spray with a selective herbicide for broad leafed weeds. Do not spray grass seeded areas within 3 months of germination.

Protection

General: Protect the newly sown areas against traffic until well established.

Fertilising after germination

Six weeks after germination: Spread fertiliser evenly over the sown area and then water in. Do not apply the fertiliser to wet grass.

Ten weeks after grass germination: If the planting establishment period carries through the summer months, spread pelleted sulphate of ammonia at the rate of 250 kg/ha.

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Mowing
Height: Mow to maintain the grass height within the required range. Do not remove more than one third of the grass height at any one time. Carry out the last mowing within 7 days before the end of the planting establishment period. Remove grass clippings from the site after each mowing.

3.3 TURFING

Supply
Elapsed time: Deliver the turf within 24 hours of cutting, and lay it within 36 hours of cutting. Prevent it from drying out between cutting and laying. If it is not laid within 36 hours of cutting, roll it out on a flat surface with the grass up, and water as necessary to maintain a good condition. Turf shall consist of 25mm depth of dense, well rooted, vigorous grass growth.

Laying
General: Turf shall be free of weeds, soil pests and diseases. The turf shall be supplied as rolls in long lengths of uniform width, not less than 300mm, and shall be in sound unbroken condition. Lay the turf in the following manner:

- In stretcher pattern with the joints staggered and close butted.
- Parallel with the long sides of level areas, and with contours on slopes.
- Finish 30mm proud of adjoining pavements to allow for settlement.
- To finish flush, after tamping, with adjacent finished surfaces of ground, paving edging, or grass seeded areas.

Tamping
General: Lightly tamp to an even surface immediately after laying. Do not use a roller.

Pegging
Stabilising: On steep slopes peg the turf to prevent downslope movement. Remove the pegs when the turf is established.

Fertilising
General: Mix the fertiliser thoroughly into the topsoil before placing the turf. Apply lawn fertiliser at the completion of the first and last mowings, and at other times as required to maintain healthy grass cover:

Watering
General: Water immediately after laying until the topsoil is moistened to its full depth. Continue watering to maintain moisture to this depth. Maintain watering to keep the grass in a healthy condition and stress free.

Mowing
Height: Mow to maintain the grass height within the required range. Do not remove more than one third of the grass height at any one time. Carry out the last mowing within 7 days before the end of the planting establishment period. Remove grass clippings from the site after each mowing.

Turfing
General: Refer to Drawings and details

Maintenance
General: Maintain turfed areas until the attainment of a dense continuous sward of healthy grass over the whole turfed area, evenly green and of a consistent height.

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Failed turf: Lift failed turf and relay with new turf.

Levels: Where levels have deviated from the design levels after placing and watering, lift turf and regrade topsoil to achieve design levels.

Top dressing
General: When the turf is established mow, remove cuttings and lightly top dress to a depth of 10 mm. Rub the dressing well into the joints and correct any unevenness in the turf surface.

3.4 PLANTING

Individual plantings in grassed areas
Method: Excavate a hole to twice the diameter of the root ball and at least 100 mm deeper than the root ball. Break up the base of the hole to a further depth of 100 mm, and loosen compacted sides of the hole to prevent confinement of root growth.

Do not use post hole diggers to excavate the hole. Ensure that there is no hard pan surface at the sides of any excavation. Refer to Landscape Detail Drawings.

Locations
General: If it appears necessary to vary plant locations and spacing to avoid service lines, or to cover the area uniformly, or for other reasons, give notice.

Planting conditions
Weather: Do not plant in unsuitable weather conditions such as extreme heat, cold, wind or rain. In other than sandy soils, suspend excavation when the soil is wet, or during frost periods.

Watering
Timing: Thoroughly water the plants before planting, immediately after planting, and as required to maintain growth rates free of stress.

Placing
Method: Remove the plant from the container with minimum disturbance to the root ball, ensure that the root ball is moist and place it in its final position, in the centre of the hole and plumb, and with the top soil level of the plant root ball level with the finished surface of the surrounding soil.

Fertilising - plants
Pellets: In planting beds and individual plantings, place fertiliser pellets around the plants at the time of planting.

Backfilling
General: Backfill with topsoil mixture. Lightly tamp and water to eliminate air pockets. Ensure that topsoil is not placed over the top of the root ball, so that the plant stem remains the same height above ground as it was in the container.

Watering basins for plants in grass
Method: Except in irrigated grassed areas and normally moist areas, construct a watering basin around the base of each individual plant, consisting of a raised ring of soil capable of holding at least 10 L.

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3.5 MULCHING

Placing mulch
General: Place mulch to the required depth, clear of plant stems, and rake to an even surface flush with the surrounding finished levels. Spread and roll mulch so that after settling, or after rolling, it is smooth and evenly graded between design surface levels sloped towards the base of plant stems in plantation beds.

In mass planted areas: Place after the preparation of the planting bed but before planting and other work.

Depths: Spread organic mulch to a depth of 75 mm, refer to details.

3.6 SPRAYING

Notice
General: Immediately give notice of evidence of insect attack or disease amongst plant material.

Spraying
Product: Where required, spray with insecticide, fungicide or both.

3.7 STAKES AND TIES

Stakes
Material: Hardwood; straight, free from knots or twists, pointed at one end.

Installation: Drive stakes into the ground at least one third of their length, avoiding damage to the root system.

Stake sizes:

- For plants ≥ 2.5 m high: Three 50 x 50 x 2400 mm stakes per plant.
- For plants 1 – 2.5 m high: Two 50 x 50 x 1800 mm stakes per plant.
- For plants < 1 m high: One 38 x 38 x 1200 mm stake per plant.

Ties
General: Provide ties fixed securely to the stakes, one tie at half the height of the main stem, others as necessary to stabilise the plant.

Tie types:

- For plants ≥ 2.5 m high: Two strands of 2.5 mm galvanized wire neatly twisted together, passed through reinforced rubber or plastic hose, and installed around stake and stem in a figure of eight pattern.
- For plants < 2.5 m high: 50 mm hessian webbing stapled to the stake.

Trunk protection
Collar guards: 200 mm length of 100 mm diameter agricultural pipe split lengthways.

3.8 COMPLETION

Product certification
Certification: Submit the supplier's written statement certifying that plants are true to the required species and type, and are free from diseases, pests and weeds.

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Maintenance manual
General: Submit recommendations for maintenance of plants.

Cleaning
Stakes and ties: Remove those no longer required at the end of the planting establishment period.

Temporary fences: Remove temporary protective fences at the end of the planting establishment period.

Warranty
Parties: Supplier(s) to the principal.

Form: All the plants supplied under these works are true-to-species and type, and free of disease, fungal infection and/or any other impediment to their future growth and that they have been fully acclimatised for the conditions of the site.

Submission of warranty: At the time of each delivery.

4 ESTABLISHMENT

4.1 General

Responsibilities

Plant establishment: Maintain the contract area during the plant establishment period.

Plant establishment period: The period between the date of practical completion and the date of final completion.

The contractor is to maintain the site to the standard described in this section prior to practical completion.

In addition, The Contractor is required to allow to maintain turfing and planting to the standards outlined from the time of planting until Practical Completion is achieved.

Existing planting and grass

Maintenance: Where existing grass or planting is within the landscape contract area, maintain it as for the corresponding classifications of new grass or planting.

Reporting

Monthly report: Submit regular reports by the last Friday of each month:

- Of the general status of works.
- Include soil test results as required for the fertilising programs.
- Plant replacement requirements.

Incident reports: Report immediately verbally and confirmed in writing any disturbance or incidence affecting or likely to affect the day to day scheduling of works.

Disruption of works by others

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Other contractors: Make arrangements to work around the disturbance.

Vandalism

Report all occurrences of vandalism immediately to the superintendent in writing including a description and location of the damage such as vandalism or theft.

4.2 Grass

Mowing and trimming

Height: Consistent with the growth habit of the grass variety and maintained at 40 mm to 50 mm throughout the year.

Program: Weekly during the mowing season, November to March, and at bi-weekly intervals during April to October. Do not mow under wet conditions.

Raking: Once every month before mowing, during the mowing season, with a flexible rake. On alternate mowings, adopt a north-south and east-west pattern.

Edges: At the same time as mowing, trim lawn edges to plant beds, pathways, base of trees and other obstacles. Ensure trees and shrubs are not damaged.

Topdressing

Topdressing material for established lawns: Weed free imported sandy topsoil to a depth of 5 mm.

Program: The spring following establishment.

Topdressing material for remediation of depressions or irregularities: Apply coarse or medium soil to AS 4419 suitable for application to turf or grass seeded areas.

Fertilising

Fertilising: Apply lawn fertiliser at the completion of the first and last mowings of the plant establishment period, and at other times as required to maintain healthy grass cover.

4.3 Planting works

Planting

Planting: Ensure the general appearance and presentation of the landscape and the quality of plant material at date of practical completion is maintained for the full planting establishment period.

Existing plant material: Maintain existing planting and grass within the landscape contract area as specified for the corresponding classifications of new grassland or planting.

Replacements: Replace failed, dead and/or damaged plants at minimum 3 week intervals as necessary throughout the full plant establishment period, or as advised by the superintendent.

Fertilising

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Soil tests: Take samples from both planting beds and lawn areas and conduct tests.

Fertilising: Base the fertilisation program on the soil testing results. Fertilise trees once every two years except where specific problems exist. Generally apply fertiliser that conforms to the fertiliser schedule. Apply fertiliser to shrubs annually in two bands and cultivated into the soil 100 mm deep.

Season: Fertilise shrubs and trees in September and March according to their seasonal growth requirement.

Insect and disease control

Responsibility for insect and disease control: Landscape contractor

Period for treatment: Until the problem has been eliminated.

Chemical spray: Apply outside of normal working hours.

Stakes and ties

Generally: If plants are unable to be self supported or if stakes are damaged, stake or restake the plants as follows:

- Drive three hardwood stakes placed obliquely with the first stake on the opposite side to the prevailing winds.
- Do not single stake large plants.

Removal: If plants are robust with well developed systems and are strong enough to no longer require support, remove stakes and ties.

Weeding

Weeds: Unwanted plants and grasses considered invasive to the locality.

Program:

- Lawns: Quarterly and as determined by the relationship of the general lawn condition and weed growth.
- Trees and shrubs: As required for planted, paved and mulched areas to be weed free when observed at bi-weekly intervals.

Method: Clear and keep clear vigorous ground covers 200 mm from the base of any shrub or tree:

- Small areas: By hand.
- Large areas: Proprietary herbicides.

Herbicide application: Avoid windy days or if rain is likely to follow within 12 hours and apply:

- To the manufacturer's instructions and material data and safety sheets.
- When the weather is humid with moderate temperatures and maximum sunlight.
- When the ground has the recommended soil moisture level.

Rubbish removal

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Rubbish: Remove loose rubbish such as bottles, papers, and cigarette butts from the site. Execute this work regularly so that all areas are free from rubbish when observed at bi-weekly intervals.

Leaf litter: Remove from all path and lawn areas.

Garbage Bins: Empty all garbage bins twice weekly

Mulched surfaces

Inspection: Bi-weekly to determine mulch requirements.

Mulch depth: Maintain 75 mm cover and ensure weed suppression and the quality of finish.

Re mulching: Maintain the original ground levels around the base of plants.

4.4 Watering

Establishment

Extent: All irrigated and non-irrigated plantings, lawn areas and street trees.

Water quality:

- pH between 5.5 and 7.5.
- Total soluble salts less than 1000 mg/litre.
- No substances that would be toxic to plant growth.

Watering program: Minimum three complete waterings soaking to a depth of 150 mm at fortnightly intervals for the first 6 weeks of plant establishment irrespective of natural rainfall.

Water restrictions: Coordinate the water supply and confirm the watering regime against federal, state and territory government legislation and restrictions at the time.

Hand watering

General: Manually water all lawn and planting areas in the absence of an irrigation system or until the proposed irrigation system is fully operational, soaking to a depth of 150 mm for lawn and 300 mm for planting. Avoid frequent dampening of the surface. Allow the surface of the soil to partially dry out between waterings.

4.5 Compliance

Criteria

Generally: Plant establishment shall be deemed complete, subject to the following:

- Repairs to planting media completed.
- Ground surfaces are covered with the specified treatment to the specified depths.
- Pests, disease, or nutrient deficiencies or toxicities are not evident.
- Organic and rock mulched surfaces have been maintained in a weed free and tidy condition and to the specified depth.
- Vegetation is established and well formed.

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- Plants have healthy root systems that have penetrated into the surrounding, undisturbed ground and not able to be lifted out of its planting hole.
- Vegetation is not restricting essential sight lines and signage.
- All hard landscape works have been installed and are operating as specified.
- Collection and removal of litter.
- Removal of mulch from drainage and access areas.

All non-conformance reports and defects notifications have been closed out.

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0251 LANDSCAPE – SOILS

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide landscape soil as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):

- *General requirements.*
- *Landscape softworks*

1.3 STANDARDS

Soils
Site and imported topsoil: To AS 4419.

Potting mixes: To AS 3743.

Composts, soil conditioners and mulches: To AS 4454.

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the following definitions apply:

- Bad ground: Ground unsuitable for the purposes of the works, including fill liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances and ground which is or becomes soft, wet or unstable.
- Site rock: Rocks selected for salvage.
- Site topsoil: Soil excavated from the site which contains organic matter, supports plant life, conforms generally to the fine to medium texture classification to AS 4419 (loam, silt, clay loam) and free from the following:
  - Stones greater than 25 mm diameter.
  - Clay lumps greater than 75 mm diameter.
  - Weeds and tree roots.
  - Sticks and rubbish.
  - Material toxic to plants.
- Site topsoil A1: Horizon consisting of soil to a depth of 200mm or to clay, which ever is shallower.
- Site topsoil A2: Horizon consisting of soil to a depth of 200mm following the removal of site topsoil A horizon.
- Site Improved topsoil: Approved Site topsoil and imported material thoroughly blended.
  - Site Improved topsoil type A: Suitable for use as A horizon. Refer to 2.1 **Topsoil properties** for mix requirements.
  - Site Improved topsoil type B: Suitable for use as B horizon. Refer to 2.1 **Topsoil properties** for mix requirements.
  - Site Improved topsoil type C: Suitable for use as turf underlay. Refer to 2.1 **Topsoil properties** for mix requirements.
- Imported topsoil: Similar to naturally occurring local topsoil, suitable for the establishment and on going viability of the selected vegetation, free of weed propagules and of contaminants, and classified by texture as follows to AS 4419 Appendix I:
  - Imported topsoil type A: Benedict Smart mix number 6 - Native Garden Soil Mix.
  - Imported topsoil type B: Benedict Smart mix number 7 - Native Garden Sub-soil Mix.

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. Imported topsoil type C: Benedict Smart mix number 1 - Turf Rootzone.
- Top dressing: A soil suitable for surface application to lawns.

1.5 GEOTECHNICAL SITE INVESTIGATION

Report
Testing: A Geotechnical Report to describe the conditions of the soil across the site following the Bulk Earthworks Contract will be provided by the Principal.

The Contractor is required to provide geotechnical information for the purpose of the works under the contract requiring footings and excavations.

Notice
If the following are encountered, give notice immediately and obtain instructions before carrying out any further work in the affected area:

- Bad ground.
- Discrepancies.
- Rock.
- Springs, seepages.
- Topsoil > 100 mm deep.

1.6 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:

- Setting out completed.
- Topsoil spread before planting.
- Grassing bed prepared before turfing, seeding, or temporary grassing.

Hold points
Inspection: Give notice so inspection may be made of the following:

- Subgrades cultivated or prepared for placing topsoil including installation of any sub soil drainage, prior to placing topsoil.
- Tree Planting holes excavated and prepared including any sub soil drainage for planting prior to placing topsoil.

1.7 SUBMISSIONS

Execution
Program: Submit a work program in the form of a bar chart, for the landscape works.

Materials
Supplier's data: Submit supplier's data including the following:

- Material source of supply for topsoil, filling, stone and filter fabrics.

Compost: Submit a certificate of proof of compost pH value.

Samples
General: Submit representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

Bulk materials: Submit a 1 kg sample of each type specified. Submit bulk material samples, with required test results, at least 5 working days before bulk deliveries.

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Soil tests for imported topsoil
Report: Submit a certificate for type tests including:

- Suitability of each soil type for its specified use.
- Similarity to naturally occurring local soil.
- Suitability for establishment and on-going viability of the site specified vegetation.
- Absence of any weed propagules or contaminants.

Ameliorants recommendation: If required to include ameliorants, recommend the source of ameliorant material, rates and methods of incorporation.

Provide test results that compare the topsoil to the specified topsoil partial size distribution and topsoil nutrient level to be able to directly compare with the table in 2.0.

Soil tests for site topsoil
Report: Submit a certificate noting the following:

- Suitability of the soil for specified use.
- Suitability for establishment and on-going viability of the site specified vegetation.
- Presence of any weed propagules or contaminants.

Recommendation:

- Soil amelioration: If required to include ameliorants, the source of ameliorant material, rates and methods of incorporation.
- Purpose: Amelioration recommendations for the following:
  - Bushland reconstruction areas.
  - Planting on grade.
  - Grass mixes.
- Weed eradication: Species and eradication method.
- Contaminant removal.
- Provide test results that compare the topsoil to the specified topsoil partial size distribution and topsoil nutrient level to be able to directly compare with the table in 2.0.

Suppliers
Statements: Submit statements from suppliers of soils and other materials, giving the following, where applicable:

- Particulars of the supplier's experience in the required type of work.
- Production capacity for material of the required type, sizes and quantity.
- Lead times for delivery of the material to the site.

2 PRODUCTS

2.1 TOPSOIL

Source
General: Where sufficient quantities of site improved topsoil are available (given proposed mix ratios) utilize this prior to using the equivalent imported topsoil. Refer to Details.

General
Deliveries: Documentation to AS 4419, clause 8.

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Additives: If using additives to raise topsoil to the required standard, ensure compliance with the relevant test criteria of AS 4419.

Nitrogen drawdown: If the NDI_{150} value is less than 0.5 to AS 4419 Appendix E add a source of soluble nitrogen to bring the value above zero.

Compost: Provide well-rotted vegetative material or animal manure, free from harmful chemicals, grass and weed growth to the organic content by mass as documented in the **SELECTIONS**.

Imported topsoil

Particle size: Provide soil to the **Topsoil particle size table** for the textures as documented.

Topsoil particle size table (% passing by mass)

AS sieve aperture to AS 1152	Soil textures		
	Fine	Medium	Coarse
2.36	100	100	100
1.18	90 – 100	95 – 100	95 – 100
0.60	75 – 100	75 – 100	70 – 90
0.30	57 – 90	55 – 85	30 – 46
0.15	45 – 70	38 – 55	10 – 22
0.075	35 – 55	25 – 35	5 – 10
0.002		2 – 15	2 – 8

Nutrient levels: Provide soil to the **Topsoil nutrient level table**.

Topsoil nutrient level table

Nutrient	Unit	Sufficiency range
Nitrate-N (NO_3)	mg/kg	> 25
Phosphate-P (PO_4) – P tolerant	mg/kg	43 - 63
Phosphate-P (PO_4) – P sensitive	mg/kg	< 28
Phosphate-P (PO_4) – P very sensitive	mg/kg	< 6
Potassium (K)	mg/kg	178 - 388
Sulphate-S (SO_4)	mg/kg	39 - 68
Calcium (Ca)	mg/kg	1200 - 2400
Magnesium (Mg)	mg/kg	134 - 289
Iron (Fe)	mg/kg	279 - 552
Manganese (Mn)	mg/kg	18 - 44
Zinc (Zn)	mg/kg	2.6 - 5.1
Copper (Cu)	mg/kg	4.5 - 6.3
Boron (B)	mg/kg	1.4 - 2.7

Method References

pH in H_2O (1:5), pH in $CaCl_2$ (1:5) and Electrical Conductivity (EC) by Rayment & Higginson (1992) method 4A2, 4B2, 3A1
Soluble Nitrate-N by APHA 4500
Soluble Chloride by Rayment & Higginson (1992) modified method 5A2
Extractable P by Mehlich 3 – ICP

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Nutrient	Unit	Sufficiency range
Exchangeable cations – Ca, Mg, K, Na by Mehlich 3 – ICP		
Extractable S by Mehlich 3 – ICP		
Extractable trace elements (Fe, Mn, Zn, Cu, B) by Mehlich 3 - ICP		

Bushland restoration nutrient levels: Provide topsoil with nutrient levels related to the soils of the local natural bushland.

Site topsoil
General: Provide site topsoil as documented in the **Imported topsoil schedule**.

Soil blend: Stripped topsoil with ameliorants noted in **SUBMISSIONS** to AS 4419 clause 4.6.

2.2 TOPSOIL PROPERTIES

Site Improved topsoil type A
30% Approved non saline Site topsoil A Horizon thoroughly blended with 70% imported sand, organic matter and chemical additives to meet the following properties.

Particle distribution for the mineral soil component:

Size fraction %by weight

>2mm <5%

1-2mm <10%

0.5 – 1mm 20-40%

0.25- 0. mm 30-40%

0.1-0.25mm 20-30%

<0.1mm <15%Topsoil properties

Topsoil properties schedule – Site Improved topsoil type A

Property	Type	Amount
Nutrient levels	Available Phosphorus (P) (Bray)	20 – 50mg / kg
	Exchangeable Potassium (K) (%)	5 - 15
	Ammonium (N)	< 50 mg/kg
	Exchangeable Calcium (Ca) (%)	65 - 75
	Nitrate (N)	20 – 50 mg/kg
	Exchangeable Magnesium (Mg) (%)	15 - 25
	Exchangeable Sodium (Na) (%)	< 10
Other properties	Organic matter (% by mass)	5 – 10% w/w
	Hydraulic Conductivity	20 – 50 cm / hour
	Soil reaction (pH)	5.5 – 6.8

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Property	Type	Amount
	Electrical conductivity (dS/m) 1:2	<1.0

Site Improved topsoil type A to have the properties shown in the above table after addition of additives recommended by soil laboratory.

Site Improved topsoil type B

10-20% by volume Approved non saline Site topsoil B Horizon thoroughly blended with 80-90% imported sand and chemical additives meeting the following properties.

Particle distribution for the mineral soil component:

Size fraction %by weight

>2mm <5%

1-2mm <10%

0.5 – 1mm 20-40%

0.25- 0. mm 30-50%

0.1-0.25mm 20-30%

<0.1mm <10%

Topsoil properties schedule – Site Improved topsoil type B

Property	Type	Amount
Nutrient levels	Exchangeable Potassium (K) (%)	5 – 15
	Exchangeable Calcium (Ca) (%)	65 – 75
	Exchangeable Magnesium (Mg) (%)	15 – 25
	Exchangeable Sodium (Na) (%)	< 10
Other properties	Organic matter (% by mass)	< 2% w/w
	Hydraulic Conductivity	20 – 50 cm/hr
	Soil reaction (pH)	5.5 – 6.8
	Electrical conductivity (dS/m) 1:2	< 1.0

Site Improved topsoil type B to have the properties shown in the above table after addition of additives recommended by soil laboratory.

Site Improved topsoil type C – turf area

25% Approved non saline Site topsoil A Horizon thoroughly blended with 75% imported sand, organic matter and chemical additives to meet the following properties.

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Particle distribution for the mineral soil component: (Turf Underlay)

Size fraction	%by weight
>2mm	<5%
1-2mm	<10%
0.5 – 1mm	20-40%
0.25- 0. mm	20-30%
0.1-0.25mm	15-25%
<0.1mm	<10%

Topsoil properties schedule – Site Improved topsoil type C

Property	Type	Amount
Nutrient levels	Available Phosphorus (P) (Bray)	20 – 50mg / kg
	Exchangeable Potassium (K) (%)	5 - 15
	Ammonium (N)	< 50 mg/kg
	Exchangeable Calcium (Ca) (%)	65 - 75
	Nitrate (N)	20 – 50 mg/kg
	Exchangeable Magnesium (Mg) (%)	15 - 25
	Exchangeable Sodium (Na) (%)	< 10
Other properties	Organic matter (% by mass)	5 – 10% w/w
	Hydraulic Conductivity	20 – 50 cm / hour
	Soil reaction (pH)	5.5 – 6.8
	Electrical conductivity (dS/m) 1:2	<1.0

Site Improved topsoil type C to have the properties shown in the above table after addition of additives recommended by soil laboratory.

2.3 TESTING

Soil tests

General: To AS 4419, Table 1. Provide complete chemical tests at an approved soil laboratory for existing site topsoil, site subsoil and tests confirming that the site improved topsoil and imported topsoil meets the required specification.

Sampling: As recommended in AS 4419 Appendix A. Take samples in the manner indicated by the testing authority, including carefully labelling bags and providing copies of the soil specification.

Laboratory: NATA registered, a recommended laboratory is;

- Sydney Environmental and Soil Laboratory
  16 Chilvers Road
  Thornleigh NSW 2120

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Telephone: (02) 9980 6554

Type of test required: "Full Soil Chemistry", "Organic Matter", "Particle Size Analysis US Sieves" and "Hydraulic Conductivity 16 Drops" as provided by Sydney Environmental Laboratory or approved equivalent.

Number of tests: As recommended by the soil testing authority. Allow for confirmation testing of site improved topsoil or imported topsoil.

Costs: All costs of soil testing to be borne by the contractor. Provide copies of all certification tests to the Contract administrator.

Imported topsoil tests: Submit the results of type tests to AS 4419 Appendix B to las applicable.

Site topsoil tests: To AS 4419 Appendix C to I.

3 EXECUTION

3.1 PREPARATION

Vegetative spoil

Spoil suitable for mulch or spreading for bushland restoration: Spread freshly harvested native plant biomass, free of weed propagules.

Unsuitable material: Remove vegetative spoil from site. Do not burn.

3.2 SUBSOIL

Ripping

General: Rip parallel to the final contours wherever possible. Do not rip when the subsoil is wet or plastic. Do not rip within the dripline of trees and shrubs to be retained.

Ripping depths: Rip the subsoil to the following typical depths:

- Compacted subsoil: 300 mm.
- Heavily compacted clay subsoil: 450 mm.

Planting beds

Excavated: Excavate to bring the subsoil to at least 300 mm below finished design levels. Shape the subsoil to fall to subsoil drains where applicable. Break up the subsoil to a further depth of 100 mm.

Unexcavated: Remove weeds, roots, builder's rubbish and other debris. Bring the planting bed to 75 mm below finished design levels.

Cultivation

Cultivation depths (mm):

- Refer to details

Services and roots: Do not disturb services or tree roots and if necessary cultivate these areas by hand.

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Cultivation: Thoroughly mix in materials required to be incorporated into the subsoil. Cultivate manually within 300 mm of paths or structures. Remove stones exceeding 25 mm, clods of earth exceeding 50 mm, and weeds, rubbish or other deleterious material brought to the surface during cultivation. Trim the surface to design levels after cultivation.

Additives

General: Apply additives after ripping or cultivation at the rate recommended by soil testing results.

3.3 TOPSOIL

Site topsoil preparation

Screeding: By a power hydraulic screen capable of handling 100 tonne per hour, with sieves grading from 20 mm to 15 mm.

Waste: Remove from site all clay lumps, balled compacted particles greater than 20 mm, stones and trash foreign to the normal composition of soil.

Contamination: If diesel oil, cement or other phytotoxic material has been spilt on the site topsoil, excavate the contaminated soil and dispose of it off the site.

Admixtures: During the screening process add the following:

- 15% by weight coarse sand minimum particle size 0.2 mm.
- Ameliorants if recommended in the soil tests specified in **SUBMISSIONS**.

Additives program: 8 weeks before stolonizing or turfing.

Placing topsoil

Site topsoil: Do not incorporate site topsoil into the works until soil testing certification has been approved. Remove unauthorised material from the site.

General: Spread the topsoil on the prepared subsoil and grade evenly, making the necessary allowances to permit the following:

- Required finished levels and contours may be achieved after light compaction.
- Grassed areas may be finished flush with adjacent hard surfaces such as kerbs, paths and mowing strips.

Spreading: On steep batters, if using a chain drag, ensure there is no danger of batter disturbance.

Finishing: Feather edges into adjoining undisturbed ground.

Consolidation

General: Compact lightly and uniformly in 150 mm layers. Avoid differential subsidence and excess compaction and produce a finished topsoil surface which has the following characteristics:

- Finished to design levels.
- Smooth and free from stones or lumps of soil.
- Graded to drain freely, without ponding, to catchment points.
- Graded evenly into adjoining ground surfaces.

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- Ready for planting.

Topsoil depths

General: Spread topsoil to the following typical depths:

- Refer to details

Surplus topsoil

General: Seek instructions for stockpiling on site in another works area for re-use

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0255 LANDSCAPE – PLANT PROCUREMENT

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide plants as documented, that have been grown to a standard that allows them to establish rapidly and grow to maturity.

Maintenance: Encourage and maintain healthy growth for the duration of the contract.

Program: Provide a suitable irrigation, pruning, fertiliser and monitoring program for all plant materials held by the supplier. Take any other precautions required to safeguard the health and well being of all plant materials before and including their delivery to site.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):

- *General requirements.*
- *Landscape* - Softworks

1.3 STANDARD

General
Tree supply: Conform to the recommendations of *NATSPEC NG 02: Specifying Trees – a guide to assessment of tree quality* (Clark R. 2003).

1.4 INTERPRETATION

Definitions
General: For the purposes of this worksection the definitions given below apply:

- Calliper: The stem or trunk diameter at a nominated point. Generally measured at 300 mm above ground.
- Destructive inspection. The washing away of all soil from a rootball to allow inspection of rootball development.
- External inspection: Tree inspection without washing away of soil from the rootball which assesses the following:
  - The tree's ability to be self-supporting.
  - Its balance.
  - Its root development.
- Investigative inspection: Any method of root inspection that involves the washing away of all or portions of the soil from the rootball to expose a section or all the roots.
- Large trees: Trees grown in containers ≥ 20 L, and ex-ground trees of size index ≥ 35.
- Partial inspection: A method of exposing a section of a root system to enable inspection of root development by washing the soil away in a wedge-shaped section from the stem to the extremity of the rootball. This soil can be gently replaced so the tree is not damaged.
- Size index: Product of height (m) x calliper (mm).
- Small trees or shrubs: Trees or shrubs grown in containers less than 20 L (other than tubes or plant cells), and ex-ground trees of size index less than 35.
- Tubes or plant cells: Trees or shrubs grown in small containers or cells in trays with a height:diameter ratio more than 3:2, typically less than 0.75 L.

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1.5 CONTINGENCY PLANT MATERIAL

Replacement
Provision: Anticipate replacement of failures on site.

Amount: 15% above any normal allowances made in the nursery trade for anticipated losses in the course of propagation and the growing on of plant materials.

Delivery: Supply to the site upon 7 days notice to the supplier.

Holding: Until the contingency plant material is delivered to site or until the expiry of twelve months from the date of completion of the works, whichever is the earlier. The supplier is not entitled to holding costs for contingency plant material.

Surplus plant material: To remain the property of the supplier.

1.6 PRE-COMPLETION TESTS

Production tests
External tree inspection:

- Frequency: Inspect trees before shipment.
- Inspector: Landscape Contractor.
- Sampling: To the **External tree inspection sampling table** for each batch of trees. Select sample trees at evenly distributed intervals within each batch.

External tree inspection sampling table

Number of trees per batch	Number of trees to sample
0 – 20	4
21 – 50	8
51 – 100	15
101 – 500	15 for the first 100 + 5% of the balance of the order
501 – 2000	35 for the first 500 + 2% of the balance of the order
2001+	65 for the first 2000 + 1% of the balance of the order

Investigative tree inspection:

- Frequency: Inspect trees before shipment.
- Inspector: Qualified person authorised by the contract administrator.
- Destructive inspection: Use for trees with rootballs/containers not more than 200 mm.
- Allowance: Allow for sample trees in addition to quantity ordered.
- Partial inspection: Use for trees with rootballs/containers more than 200 mm.
- Sampling: To the **Investigative tree inspection sampling table** for each batch of trees. Select sample trees at evenly distributed intervals throughout each batch.

Investigative tree inspection sampling table

Number of trees per batch	Number of trees to sample
0 – 20	1
21 – 50	2
51 – 100	4
101 – 500	4 for the first 100 + 2% of balance of order

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Number of trees per batch	Number of trees to sample
501 – 2000	12 for first 500 + 1% of balance of order
2001+	27 for the first 2000 + 0.5% of balance of order

1.7 INSPECTION

Notice – off site
Inspection: Give notice so that inspection may be made of the following:

- At completion of stocking of plant material, deemed to be as close as practical to 100% in terms of species and numbers.
- At the date of commencement of delivery.

1.8 SUBMISSIONS

Plant certification
Species: Provide written certification that all plant material is true to the required species and type.

Forward order contracts
Reports: Complete regular reports using the pro forma **Tree inspection form** provided in **Selections**.
Include checks against specification requirements.

- Photographs: Provide current colour copies with date verification.
- Inspection: Complete and return the attached pro-forma **Tree inspection form** before despatch of every batch, and at the following frequencies:
  - Inspections: At 3 monthly intervals.
- Reports: At time of inspections.

Photographic examples
Requirement: Submit photographic examples as follows:

- All palm species.
- 100, 200, 400 L plant species.
- Specimen plant species.

Program: Within fourteen (14) days of the date of contract.

Clarity: Sufficient to be able to ascertain the species, size and quality of a single specimen of the subject plant.

Identification: Provide photographs as follows:

- In colour.
- With a clearly identifiable scale reference located in the same plane as the plant stem or trunk.
- Labelled with plant species name.

Test results
General: Complete and return the **Tree inspection form** for each batch inspected.

Rejection: Non-compliance may lead to rejection of the entire batch.

Corrective action: Comply with corrective action procedures for each order as instructed.

Substitution: If non-complying trees are proposed, submit a proposal in writing.

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Authentication: Supply a copy of the written approval of substitution with any non-complying trees.

2 PRODUCTS

2.1 BALANCE

Small trees and shrubs
Conformance at inspection: To balance (small plants) assessment requirements.

Balance (small plants) assessment requirements:

- Tubes or plant cells: Provide height above soil level between 1.5 and 2.5 times the height of the tube or plant cell.
- Trees and shrubs in containers < 20 L (other than tubes or plant cells) or ex-ground trees of size index < 35 (e.g. 1.4 m high x 25 mm calliper): Height must fall within the range indicated for the container size in the Small container-grown plant table.
- Containers/rootballs (other than tubes or plant cells) must remain flat on the ground when the stem, held at 80% of height above ground, is deflected 30° from the vertical, side to side.

Exempt: Species that naturally produce hard inflexible wood in the early stages of their development.

Small container-grown plant table

Container size or minimum rootball diameter	Height range (m)	
	Thin-stemmed species	Thick-stemmed species
Tubes or plant cells	Height between 1.5 and 2.5 x the height of the container	
150 mm (1.8 L)	0.4 – 0.6	0.3 – 0.5
170 mm (2.6 L)	0.5 – 0.7	0.4 – 0.6
200 mm pot (4 L)	0.7 – 0.9	0.6 – 0.8
200 mm bag (5 L)	0.8 – 1.0	0.7 – 0.9
250 mm (8 L)	1.0 – 1.2	0.8 – 1.0
300 mm (15 L)	1.2 – 1.5	1.0 – 1.2

Large trees
Conformance at inspection: To balance (large trees) assessment requirements.

Balance (large trees) assessment requirements:

- For trees grown in containers ≥ 20 L, the size index must lie within the range for the nominal container size shown in the **Common container volumes table**.
- Ex-ground trees with a size index ≥ 35 (e.g. 1.4 m high x 25 mm calliper) must have rootball diameters not less than the minimum rootball diameters shown in the **Ex-ground trees table**.

Common container volumes table

Size index	Nominal container volume (L)	Size index	Nominal container volume (L)
26-33	20	371-480	450
32-41	25	412-518	500
45-58	35	453-587	550
57-74	45	495-640	600

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Size index	Nominal container volume (L)	Size index	Nominal container volume (L)
77-99	60	533-716	700
83-107	75	632-818	800
111-143	100	711-921	900
154-200	150	791-1023	1000
194-251	200	842-1089	1100
227-314	250	918-1188	1200
273-353	300	1148-1485	1500
289-373	350	1530-1980	2000
330-427	400	1913-2475	2500

Ex-ground trees table

Size index	Minimum rootball diameter (mm)	Size index	Minimum rootball diameter (mm)
36–55	350	341–383	850
56–72	400	384–429	900
73–106	450	430–530	1000
107–131	500	531–642	1100
132–156	550	643–732	1200
157–173	600	733–859	1300
174–228	650	860–1144	1500
229–249	700	1145–1507	1750
250–299	750	1508–1968	2000
300–340	800	1969–3075	2500

Photographs: Provide current colour copies with date verification.

2.2 GENERAL QUALITIES

Labelling

General: Clearly label individual plants and batches.

- Label type: To withstand transit without erasure or misplacement.
- Label frequency: Label at least one plant of each species or variety in a batch with a durable readable tag.

Health and vigour

Health: Supply plants with foliage size, texture and colour at time of delivery consistent with the size, texture and colour shown in healthy specimens of the nominated species.

Vigour: Supply plants with extension growth consistent with that exhibited in vigorous specimens of the species nominated.

Damage: Supply plants free from damage and from restricted habit due to growth in nursery rows.

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Stress: Supply plants free from stress resulting from inadequate watering, excessive shade or excessive sunlight experienced at any time during their development.

Site environment: Supply plants that have been grown and hardened off to suit the conditions that could reasonably be anticipated to exist on site at the time of delivery.

Root development
Containers: Grow plants in their final containers for the following periods:

- Plants < 25 L size: > 6 weeks.
- Plants > 25 L size: > 12 weeks.

Freedom from pests and disease
Pests and disease: Supply plants with foliage free from attack by pests or disease.

Native species with a history of attack by native pests: Restrict plant supply to those with evidence of previous attack to less than 15% of the foliage and ensure absence of actively feeding insects.

2.3 BELOW-GROUND QUALITIES – PLANTS

Root system
Requirement: Supply plant material with the root system:

- Well proportioned in relation to the size of the plant material.
- Conducive to successful transplantation.
- Free of any indication of having been restricted or damaged.

Root inspection: If inspection is by the removal of soil test as follows:

- For > 100 samples: Inspect 1%.
- For < 100 samples: Inspect 1 sample.

Sample plants: Replace.

Defective samples: Not to be accepted

Rejection: Root bound stock.

2.4 ABOVE-GROUND QUALITIES - TREES

Supply
Supply trees that:

- Are free from injury.
- Are self-supporting.
- Have the calliper at any given point on the stem greater than the calliper at any higher point on the stem.

Pruning
Clean stem height: < 40% of total tree height.

Pruning wounds
Extent: Restrict fresh (i.e. recent, non-calloused pruning wounds) to < 20% of total tree height.

Type: Ensure a clean-cut at the branch collar.

Diameter of wound: < 50% of the calliper immediately above the point of pruning.

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Apical dominance
Species with an excurrent form: Supply trees with a defined central leader and the apical bud intact.

Crown symmetry
Crown distribution: Difference on opposite sides of the stem axis less than 20%.

Stem structure
Species with excurrent form: Supply trees with a single stem roughly in the centre of the tree with any deviation from vertical less than 15º.

Species with decurrent form: Supply trees where the central stem is not divided at any point lower than the clean stem height nominated, and that the stem junction at the point of division is sound.

All species: Ensure that branch diameter is less than or equal to one-half of the calliper immediately above the branch junction.

Included bark
General: Supply trees where the branch/stem bark ridges at junctions between stems and branches and between co-dominant stems are convex, except for species prone to include bark that are known to remain strong.

Trunk position
General: Supply trees with the distance from the centre of the trunk to the extremity of the rootball not varying by more than 10%.

Compatibility of graft unions
General: Supply trees where the union between the scion and rootstock is sound for the entire perimeter of the graft, and the diameter of the scion immediately above the graft is equal to the diameter of the rootstock immediately below the graft (± 20%).

Indication of north
Trees in containers > 100 L or of size index > 140: Indicate the northerly aspect during growth in the nursery to withstand transit without erasure or misplacement.

2.5 BELOW-GROUND QUALITIES - TREES

Root division
Trees in containers ≤ 45 L or ex-ground trees with a size index ≤ 70: Primary division of roots at less than 100 mm intervals.

Trees in containers > 45 L or ex-ground trees with a size index > 70: Primary division of roots within the outer 50% of the rootball at less than 100 mm intervals.

Root direction
General: Ensure that roots, from the point of initiation, generally grow in an outwards (radial) or downwards direction, and that any deviation from the established direction < 45º.

Trees with a calliper at ground level < 40 mm: Ensure that the diameter of any nonconforming roots at the extremity of the rootball less than 25% of the calliper.

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Trees with a calliper at ground level ≥ 40 mm: Ensure that the diameter of any nonconforming roots at the extremity of the rootball less than 10 mm.

Rootball occupancy
Soil retention: On shaking or handling the unsupported rootball at least 90% of the soil volume to remain intact.

Rootball depth
Rootball depth assessment for containers/rootballs ≥ 45 L or larger:

- Depth: ≤ maximum depth specified and no rootball (regardless of size) more than 550 mm in depth.
- Diameter: ≥ depth.

Height of root crown
General: Ensure that root crown is at the surface of the rootball.

Non-suckering rootstock
Grafted cultivars/varieties: Supply trees grafted onto non-suckering rootstock.

3 EXECUTION

3.1 WARRANTIES

True-to-species
Parties: Supplier(s) to the principal.

Form: All the plants supplied under these works are true-to-species and type, and free of disease, fungal infection and/or any other impediment to their future growth and that they have been fully acclimatised for the conditions of the site.

Submission of warranty: At the time of each delivery.

Maintenance
Parties: Supplier(s) to the principal.

Form: Maintain all plant materials sourced and secured by the supplier throughout the procurement and pre-transplanting maintenance period. Cover the cost of purchase, labour, equipment, transport and materials to replace any losses, with plant materials of equivalent sizes and quality during the warranty period. Ensure that it is physically possible for any or all of the on site plant material to be successfully prepared and transplanted.

Warranty period:

- Commencement: The date of contract.
- Completion: To cease in respect of any particular plant material upon issue of a delivery notice issued by the contractor upon delivery to site.
- Earliest delivery date: One week after the date of contract.

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4 SELECTIONS

4.1 TREE INSPECTION FORM

General

Date		Reference	
Purchaser			
Supplier		Inspected by (supplier/purchaser/agent)	
Species		Batch identification	
Number of trees in batch		Container/rootball size	
Height range		Calliper range	
Special requirements			

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Above ground

Labelling	
Health and vigour	
Freedom from pests/disease	
Freedom from injury	
Self-supporting	
Stem taper	
Pruning	
Apical dominance	
Crown symmetry	
Stem structure	
Included bark	
Trunk position	
Compatibility of graft unions	
Indication of north	

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Below ground	
Inspection method used	
Number of trees in sample	
Root division	
Root direction	
Diameter nonconforming roots at rootball extremity	
Rootball occupancy	
Rootball depth	
Height of root crown	
Non-suckering rootstock	

Conformance with specification	
Conforming	
Comments	
Name and signature (inspector)	

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0261 LANDSCAPE – FURNITURE AND FIXTURES

1 GENERAL

1.1 RESPONSIBILITIES

General
Requirement: Provide landscape furniture and fixtures, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):

- *General requirements.*

1.3 INSPECTION

Notice
Inspection: Give notice so that inspection may be made of the following:

- Custom-built fixtures fabricated and ready to be delivered to the site.
- Furniture items delivered to site before installation.
- Site locations or substrates prepared to receive furniture or fixtures before installation.

1.4 SUBMISSIONS

Installation
General: Submit the manufacturer's standard drawings and details showing methods of construction, assembly and installation; with dimensions and tolerances.

Preservative treatment
CCA treated timber: If proposed to be used, submit details.

Subcontractors
General: Submit names and contact details of proposed suppliers and installers.

2 EXECUTION

2.1 FIXING

Erection
Line and level: Erect posts or poles vertically. Erect furniture items level. Provide a level area around benches and seats where installed on slopes.

2.2 COMPLETION

Maintenance manual
General: Submit the manufacturers' data as follows:

- Recommendations for service use, care and maintenance.
- List of manufacturers and suppliers of replacement parts.

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3 SELECTIONS

3.1 FURNITURE

Seat type 1
Type: Seat

Supplier: Street Furniture Australia

Product No.: Galleria with armrest

Finish: Silverwood MoD wood and Black orbit 429 powder coated

Fixing: Refer drawings and manufacturers specifications

Bench and Table (Picnic setting)
Type: Picnic setting type 2 (consisting of two benches without back or arms and one table)

Supplier: Street Furniture Australia

Product No.: SFA / Table CMG608 + Classic Galleria Slim Bench CMG804

Finish: Silverwood MoD wood and Black orbit 429 powder coated

Fixing: Refer drawings and manufacturers specifications

Bin
Type: Dual Bin, Wood

Supplier: Street Furniture Australia

Product No.: Street Furniture Australia / WBE-F120-DUAL-BAT Curved Roof, Vertical Timber Battens, Wheelie Bin Enclosure 120L.

Finish: Roof and Frame Black orbit 429 powder coated. Panel material Silverwood MoD wood

Fixing: Refer drawings and manufacturers specifications

BBQ Type 2
Type: Triple

Supplier: Christie Parksafe

Product No. Modular system triple installation kit with 2 x Electric CCQ hotplate

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Finish: N0.4 Brushed stainless steel finish

Fixing: Refer drawings and manufacturers specifications

Bollard
Type: Fixed

Supplier: Street Furniture Australia

Product No.: SFA B3F Fixed bollard

Finish: Stainless steel

Fixing: Refer drawings and manufacturers specifications

Bike Racks
Type: Fixed

Supplier: Street Furniture Australia

Product No.: SFA Bike Stand BST04

Finish: Stainless steel

Fixing: Refer drawings and manufacturers specifications.

Sporting Fence
Type: Fixed

Supplier: Hills fencing or approved equivalent

Product No.: 1200mm (H) Chain wire top and bottom rail fencing

Finish: Black orbit 429 powder coated

Fixing: Refer to manufacturers specifications.

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Basketball hoop, backboard and pole structure (x2)
Type: Fixed

Supplier: RMA Sport or approved equivalent

Product No.: BBESO

Finish: Black orbit 429 powder coated

Fixing: Refer to Inhouse Engineers details and specifications

Netball hoop and pole structure (x2)
Type: Fixed

Supplier: RMA Sport or approved equivalent

Product No.: NBAL

Finish: Black orbit 429 powder coated

Fixing: Refer to Inhouse Engineers details and specifications

Learn to Ride road signs
Type: Fixed

Supplier: Road signs Australia or approved equivalent

Product No.: Refer to landscape detail drawings for type and numbers

Finish: Refer to landscape detail drawings

Fixing: Refer to landscape detail drawings and Inhouse Engineers details and specifications

ADIZONE, Basketball and Netball Court Surface
Surface Supplier: Courtcraft Pty Ltd or approve equivalent

Product No.: Plexipave acrylic colour finish system – Basketball/Netball

Material: Refer manufacturers details

Colour: Sahara Sand (submit sample prior to commencement)

Finish: Refer manufacturers details

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Fixing: Refer manufacturers details. For structural base refer to Inhouse Engineers detail and specification

Fitness Equipment
Type: Fixed

Supplier: Norwell Fitness Equipment

Product No.: NW101 Chest strength

NW103 Chest strength

NW104 Chest strength

NW106 Leg strength training

NW201 Air Walker

NW202 Cross warm up

NW204 Hip strength training

NW302 Springer

Fixing: Refer to manufacturers specifications.

Boom Gate
Type: Lockable gate system

Supplier: As per existing southern boundary carpark

Product No.: As per existing southern boundary carpark

Finish: Powder coated finish in British Paint 'Black Orbit' 429

Fixing: As per manufacturers recommendations

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Hand rails to stairs and Ramp
Type: Fixed

Supplier: Contractor to source

Product No.: Refer to landscape detail drawings for indicative detailing

Finish: Stainless steel

Fixing: Shop drawings to be provided and approved by superintendent

Sandstone boulders
Supplier: Contractor to propose

Size: Refer drawings

Multifunctional AFL field posts (x2)
Supplier: Contractor to propose

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0310 CONCRETE – COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide cast concrete, as documented and as follows:

- Conforming to the design details and performance criteria.
- Satisfying quality and inspection requirements.
- Compatible with documented finishes.

Formwork: Design and construct formwork so that the concrete, when cast in the forms, will have the required:

- Dimensions.
- Location.
- Profile.
- Shape.
- Surface finish.

Design

Formwork: The design of formwork, other than profiled steel sheeting composite formwork, is the contractor's responsibility. Allow for dimensional changes, deflections and cambers resulting from the following:

- Imposed actions.
- Concrete shrinkage and creep.
- Temperature changes.
- The application of prestressing forces (if any).

Structural design: To AS 3600.

Post-tensioning: To AS 3600.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following worksection(s):

- *General requirements.*
- Refer to Inhouse Engineers detail and specification

1.3 STANDARDS

General

Formwork design and construction, formed surfaces: To AS 3610 and AS 3610.1.

Plywood formwork: To AS 6669.

Profiled steel sheeting, including shear connectors: To AS 2327.1.

Specification and supply of concrete: To AS 1379.

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Reinforced concrete construction: To AS 3600.

Residential ground slabs and footings: To AS 2870.

Post-tensioning: To AS 3600.

Concrete structures for retaining liquids: To AS 3735.

Strand, bar and wire: To AS/NZS 4672.1.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Anti-burst reinforcement: Reinforcement cage surrounding anchorages to control the tensile bursting stresses.
- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Average ambient temperature: Average value of the daily maximum and minimum ambient temperatures over the relevant period at a site.
- Batch: A quantity of concrete containing a fixed quantity of ingredients and produced in a discrete operation.
- Concrete class:
  - Normal: Concrete which is specified primarily by a standard compressive strength grade and otherwise conforming to AS 1379 clause 1.5.3.
  - Special: Concrete which is specified to have certain properties or characteristics different from, or additional to, those of normal-class concrete and otherwise conforming to AS 1379 clause 1.5.4.
- Early age strength: A mean compressive strength at 7 days exceeding the values shown in AS 1379 Table 1.2.
- Formwork:
  - Jump formwork: Incrementally moved formwork.
  - Lost formwork: Sacrificial formwork left in place.
  - Slip formwork: Continuously slipped or moving formwork.
  - Table forms: Prefabricated and re-usable formwork systems for slabs and beams.
- Green concrete: Concrete which has set but not appreciably hardened.
- Production assessment: An assessment procedure for concrete specified by strength grade, carried out by the supplier on concrete produced by a specific supplying plant and based on the statistical assessment of standard compressive strength tests on concrete.
- Project assessment: An assessment procedure for concrete specified by strength grade, specified at the customer's option, which provides additional test data for the statistical assessment of concrete supplied to a specific project.
- Sample: A portion of the material used in the works, or to take such a sample.
- Specimen: A portion of a sample which is submitted for testing.
- Weather:
  - Cold: Ambient shade temperature less than 10°C.
  - Hot: Ambient shade temperature greater than 30°C.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Base or subgrade before covering.
- Membrane or film underlay installed on the base or subgrade.
- Used formwork, after cleaning and before re-use.
- Concealed surfaces or elements before covering.
- Commencement of concrete placing.

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- Commencement of initial, incremental or final stressing of tendons.
- Cutting and grouting tendons.
- Evaluation of surface finish.

Hold Points
Inspection: Give notice so that inspection may be made of the following:

- Completed formwork and reinforcement, tendons, cores, fixings and embedded items fixed in place.
- Evaluation of the off-form finishes.
- Evaluation of surface finish.
- Setout of curved formwork.
- Sample panels of walls, champhered edges and tie bolt locations. Refer to **Aggregates and colour selection schedule** in **Selections** and **Prototypes and samples**.

1.6 TOLERANCES

Formwork
Plumb of elements > 8 m high: 1:1000.

Plumb of elements ≤ 8 m high: To AS 3610.1.

Position: Construct formwork so that finished concrete conforms to AS 3600 clause 17.5 and as documented in the **Formwork dimensional deviation schedule**.

Reinforcement
Fabrication and fixing: To AS 3600 clause 17.2.

Reinforcement and tendon position: To AS 3600 clause 17.5.3.

Finishes
Formed surfaces quality of surface finish: To AS 3610.1 Table 3.3.2.

Unformed surfaces flatness: To the **Flatness tolerance class table**, for the documented class of finish, using a straightedge placed anywhere on the surface in any direction.

Flatness tolerance class table

Class	Measurement	Maximum deviation (mm)
A	2 m straightedge	4
B	3 m straightedge	6
C	600 mm straightedge	6

1.7 SUBMISSIONS

Calculations
Formwork calculations: Submit calculations by a professional engineer experienced in formwork design to show that allowable concrete stresses will not be exceeded and formwork capability will be maintained for the following:

- Proposed formwork procedures or loadings which differ from those documented.
- Props above a floor that do not coincide with the props below.
- Undocumented formwork shoring or stripping procedures or allowable loadings from stacked materials.

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Post-tensioned calculations: Submit the following:

- Calculations of tendon jacking forces, theoretical extensions and losses for each stressing stage.
- Amount of draw-in expected in seating anchorages, friction along tendon (wobble) coefficient and friction curvature coefficient for tendons and duct-forming material.

Certification

Formwork design certification: For other than profiled steel sheeting composite formwork, submit certification by a professional engineer experienced in formwork design verifying conformance of the design.

Formwork execution certification: Submit certification by a professional engineer experienced in formwork design and construction verifying conformance of the completed formwork, including the suitability of the formwork for the documented surface finish class.

Post-tensioned concrete certification: Submit independent certification by professional engineer of the design and erected framing.

Design

Loading: Submit details of proposed construction systems, loads and procedures, including propping and re-shoring.

Execution details

Moveable formwork: Provide the following details on the formwork drawings:

- Table, slip and jump forms: Proposed method and sequence of moving the formwork to provide concrete of the documented quality and surface finish.
- Slip forms: The average rate of movement.

Re-shoring: Submit details of any proposed re-shoring.

Surface repair method: Submit details of any proposed surface repair method before starting repairs.

Concrete: Submit proposals for mixing, placing, finishing and curing concrete including the following:

- Changes to the concrete mix.
- Curing and protection methods.
- Curing period for low-pressure steam curing.
- Cutting or displacing reinforcement, or cutting or coring hardened concrete.
- Handling, placing, compaction and finishing methods and equipment, including pumping.
- Placing under water.
- Sequence and times for concrete placement, and construction joint locations and relocations.
- Site storage, mixing and transport methods and equipment, if applicable.
- Temperature control methods.
- Sequence of concrete placement: Submit details of any proposed If sequential placement of slab segments.
- Sawn joints: Submit details of proposed methods, timing and sequence of sawing joints.

Reinforcement: Submit the following:

- General: Details of any proposed changes to documented reinforcement.
- Damaged galvanizing: Details of proposed repair to AS/NZS 4680 Section 8.
- Mechanical bar splices Details and test certificates for each size and type of bar to be spliced.

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- Provision for concrete placement: Details of spacing or cover to reinforcement that does not conform to AS 3600.
- Splicing: Details of any proposed changes to documented requirements.
- Welding: Details of any proposed welding of reinforcement.

Pre-mixed supply delivery dockets: For each batch, submit a docket listing the information required by AS 1379, and the following:

- For special class performance concrete: Documented performance and type of cement binder.
- For special class prescription concrete: Details of mix, additives, and type of cement binder.
- Method of placement and climate conditions during pour.
- Name of concrete delivery supervisor.
- Project assessment carried out each day.
- The concrete element or part of the works for which the concrete was ordered, and where it was placed.
- The total amount of water added at the plant and the maximum amount permitted to be added at the site.

Materials

Product conformity: Submit current assessments of conformity, as appropriate, as follows:

- Certificate of conformity by a JAS-ANZ accredited third party.
- Report by a NATA accredited laboratory describing tests and giving results which demonstrate that the product conforms.

Concrete mixes: Submit details, for each grade and type of concrete including any proposed use of special-purpose cement types.

Curing compounds: Submit details of any proposed liquid membrane-forming curing compound, including the following:

- Certified test results for water retention to AS 3799 Appendix B.
- Evidence of compatibility with concrete, and with applied finishes including toppings and render, if any, including methods of obtaining the required adhesion.
- For visually important surfaces, evidence that an acceptable final surface colour will be obtained.

Admixtures: Submit details of any proposed admixtures, including the following:

- Brand name.
- Place of manufacture.
- Basic chemical composition.

Void formers: Use void formers tested under laboratory conditions. Place formers on damp sand and load with a mass of wet concrete at least equal to the mass of the beams or slabs to be supported. Submit certified test results to verify conformance with the following requirements:

- Deflection during placing and compaction of the concrete does not exceed beam or slab span/1000.
- Additional deflection between initial set and 7 days does not exceed span/400.
- Collapse and loss of load carrying capacity occurs not more than 48 hours after flooding with water, creating a void at least 60% of the original depth of the void former.

Reinforcement strength and ductility: Submit type-test reports to verify conformance to AS 3600 Table 3.2.1 for each reinforcement type.

Post tensioning: Submit the following:

- Grout: Proposed grout mix and certified test results (including grading, proportions, compressive strength, shrinkage and additives, if any).
- Epoxy grout: If required, proposed formulation.

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- Duct-forming material: Samples of proposed material.
- Prestressing steel: Test certificates to AS/NZS 4672.2 for every delivery of strand, bar or wire proposed.

Records
Post-tensioned concrete: submit the following:

- Post-tensioning record.
- Post-tensioning stressing schedule.
- Post-tensioning grouting record.

Prototypes and Samples
- . Two 3x3m and 100mm thick sample panels of each paving type to be located together in the project compound to review workmanship and aggregate mix. Samples panels to include examples of joints and finishes. Maintain as sample panels throughout the contract or until advised. Demolish at the end of construction.
- Sample of typical steps to be approved prior to proceeding with remaining stairs. Should sample be acceptable it may be integrated in the final works. Sample to include minimum of 3 treads.

Shop drawings
Cores, fixings and embedded items: Submit the proposed locations, clearances and cover and show any proposed repositioning of reinforcement.

Formwork: Submit shop drawings including details of proposed linings, bolt positions, facings, release agents and, where applicable, re-use of formwork.

Post-tensioned drawings: Submit shop drawings showing the following:

- Profiles, sizes and details of tendons, tendon numbers, anchorages, ducts, duct formers, splicing, sheathing, end block reinforcement and other associated components.
- Stressing requirements including sequence of stressing, jacking forces and the basis of assumed loss calculations.
- Number, size and position of grout openings, vents and drain holes in the ducts.

Subcontractors
Pre-mixed supply: Submit names and contact details of proposed pre-mixed concrete suppliers and alternative source of supply in the event of breakdown of pre-mixed or site mixed supply.

Tests
Other tests: Submit results, as follows:

- Site slip resistance test of completed installation to AS 4663.
- Concrete compressive strength test results to AS 1012.9.

2 PRODUCTS

2.1 MATERIALS

General
Stockpile: If uniform, consistent colour is documented , stockpile sand, cement and aggregates.

Aggregates
Standard: To AS 2758.1.

Cement
Standard: To AS 3972.

Age: Less than 6 months old.

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Storage: Store cement bags under cover and above ground.

Water
Standard: To AS 1379 clause 2.4.

Requirement: Clean, free from oil, acid, alkali, organic or vegetable matter and including not more than 500 mg/l of chloride ions.

Polymeric film underlay
Vapour barriers and damp-proofing membranes: To AS 2870 clause 5.3.3.

Chemical admixtures
Standard: To AS 1478.1.

Contents: Free of chlorides, fluorides and nitrates.

Curing compounds
Curing compounds: To AS 3799.

2.2 CONCRETE

Properties
Concrete mix and supply: Conform to the following:

- Normal-class: To AS 1379 clause 1.5.3.
  - Properties: As documented in the **Concrete properties schedule - performance**.
- Special-class: To AS 1379 clause 1.5.4.
  - Properties: As documented in the **Concrete properties schedule - performance**.

Coloured concrete
Standard: To AS 3610.1.

2.3 TESTING

General
Test authority: Concrete supplier or NATA registered laboratory.

Reports and records of test results: To the relevant parts of the AS 1012 series. Keep results on site.

Assessment process of test results
Standard: To AS 1379.

Method of assessment: Project assessment.

Sampling
Method of sampling: AS 1012.1.

Sampling locations: To AS 1012.1 and the following:

- Slump tests: On site, at the point of discharge from the agitator.
- Compressive strength tests: Spread the site sampling evenly throughout the pour.

Frequency of sampling: To AS 1379 Sections 5 and 6 and the following:

- Slump tests: Take at least one sample from each batch.
- Compressive strength tests: To the **Project assessment strength grade sampling table**.

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Project assessment strength grade sampling table

Number of batches for each type and grade of concrete per day	Minimum number of samples: Columns and load bearing wall elements/batch	Minimum number of samples: Other elements/day
1	1	1
2-5	1	2
6-10	1	3
11-20	1	4
each additional 10	1	1 additional

Making and curing of specimens
General: To AS 1012.8.1 and AS 1012.8.2.

Specimens for compressive strength tests: Make and cure at least two specimens from the sample of each grade.

Specimen size:

- Aggregate size ≤ 20 mm: Nominally 200 x 100 mm diameter.
- Aggregate size > 20 mm: Nominally 300 x 150 mm diameter.

2.4 FORMWORK

General
Form linings, facings and release agents: Compatible with finishes applied to concrete.

Lost formwork: Free of timber or chlorides, and not to impair the structural performance of the concrete members.

Void formers: Material capable of maintaining rigidity and shape until the concrete has set, capable of withstanding construction loads and non-collapsible on absorption of moisture.

Profiled steel sheeting composite formwork
Material: Hot-dipped zinc-coated sheet steel to AS 1397.

Minimum steel grade: G550.

Zinc coating weight: Z350: 350G/M2

Accessories: Adopt material and corrosion protection to match the profiled steel sheeting.

Plywood formwork
Material: Plywood sheeting to AS 6669.

Grade: Use appropriate grade for the documented design dimensions, loading and surface quality.

Joints: Seal the joints consistent with the documented surface finish class.

Tolerances: To AS 3610.1 Section 3.

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2.5 REINFORCEMENT

General:

Conform to *Inhouse Engineers Structural notes Drawing*

Steel reinforcement
Standard: To AS/NZS 4671.

Ductility class: Refer to Structural Engineers Drawings

Strength grade and ductility class: Refer to Structural Engineers Drawings

Surface condition: Free of loose mill scale, rust, oil, grease, mud or other material which would reduce the bond between the reinforcement and concrete.

Protective coating
Standard: To AS 3600 clause 17.2.1.2.

Epoxy coating: High build, high solids, chemically resistant coating.

- Thickness: 200 µm minimum.

Galvanizing: To AS/NZS 4680, as follows:

- Sequence: If fabricating after galvanizing, repair damaged galvanising and coat cut ends.
- Zinc-coating (minimum): 600 g/m^2.

Tie wire
General: Annealed steel 1.25 mm diameter (minimum).

External and corrosive applications: Galvanized.

2.6 MISCELLANEOUS

Surface hardeners, sealants and protectors
Supply: If documented, provide proprietary products conforming to the manufacturer's recommendations.

Slip resistance treatment
Slip resistance classification: To AS/NZS 4586.

Anti-Graffiti Coating
Application: Apply sacrificial anti graffiti coating to all concrete & sandstone walls, and precast concrete elements, installed to manufacturers specification.

Product: equivalent DULUX Durethane® Clear in a Matt Finish.

3 EXECUTION

3.1 FORMWORK

Preparation
Cleaning: Before placing concrete, remove free water, dust, debris and stains from the formwork and the formed space.

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Bolt holes
Removable bolts: Remove tie bolts without damaging the concrete.

Formwork tie bolts left in the concrete: Position more than 50 mm from the finished surface.

Bolt hole filling: Provide material with durability and colour matching the concrete.

Recessed filling: Fill or plug the hole to 6 mm below the finished surface.

Corners
Work above ground: Chamfer at re-entrant angles, and fillet at corners.

Face of bevel. Refer to details.

Embedments
Fixing: Fix embedments through formwork to prevent movement, or loss of slurry or concrete, during concrete placement.

Openings
Inspection: In vertical formwork provide openings or removable panels for inspection and cleaning, at the base of columns, walls and deep beams.

Access: For thin walls and columns, provide access panels for placing concrete.

Release agents
Application: Before placing reinforcement, apply a release agent to linings and facings.

Slip formwork
Provision for inspection: Provide access below the moveable formwork for surface treatment and inspection.

Profiled steel sheeting composite formwork
Fixing: If sheeting cannot be fixed to structural steel supports with puddle welds, or with welded shear studs in composite construction, provide details of proposed fixings.

Steel linings
Rust: Clean off any rust and apply rust inhibiting agent before re-use.

Formwork sizes
Use as large Use as large pieces of formwork as possible to minimise the number of visible formwork joints in visually important surfaces.

Curved formwork
All curved formwork faces are to be set to the radiuses nominated. Curved elements are to form a smooth continuous curves with no flat spots, kinks or non tangenting radiuses. This will be assessed visually by looking along the length of the curve and with templates as required. Particular care is to be taken in ensuring formwork panels continue along the curve alignment at form joints. Where timber or other forms are used for curved surfaces, the radiuses must be set up with curved metal pipe or shs or similar to ensure a very accurate and consistent curved faces.

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Visually important surfaces
Surface finish classes 1, 2 or 3: Set out the formwork to give a regular arrangement of panels, joints, bolt holes, and similar visible elements in the formed surface.

Void formers
Protection: Keep void formers dry until use, install on a firm level surface and place reinforcement and concrete with minimum delay.

3.2 REINFORCEMENT

Dowels
Fixing: If a dowel has an unpainted half, embed in the concrete placed first.

Tolerances:

- Alignment: 1:150.
- Location: ± half the diameter of the dowel.

Grade: 250 N.

Cover
Concrete cover generally: To AS 3600 clause 4.10.

Concrete cover for structures for retaining liquids: To AS 3735.

Concrete cover for residential ground slabs and footings: To AS 2870.

Supports
Proprietary concrete, metal or plastic supports: Provide chairs, spacers, stools, hangers and ties, as follows:

- Able to withstand construction and traffic loads.
- With a protective coating if they are ferrous metal, located within the concrete cover zone, or are used with galvanized or zinc-coated reinforcement.

Spacing:

- Bars: ≤ 60 diameters.
- Mesh: ≤ 800 mm.

Supports over membranes: Prevent damage to waterproofing membranes or vapour barriers. If appropriate, place a metal or plastic plate under each support.

Projecting reinforcement
Protection: If starter or other bars extend beyond reinforcement mats or cages, through formwork or from cast concrete, provide a plastic protective cap to each bar until it is cast into later work.

Tying
General: Secure the reinforcement against displacement at intersections with either wire ties, or clips. Bend the ends of wire ties away from nearby faces of formwork or unformed faces to prevent the ties projecting into the concrete cover.

Beams: Tie stirrups to bars in each corner of each stirrup. Fix other longitudinal bars to stirrups at 1 m maximum intervals.

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Bundled bars: Tie bundled bars in closest possible contact. Provide tie wire of at least 2.5 mm diameter and spaced not more than 24 times the diameter of the smallest bar in the bundle.

Columns: Secure longitudinal column reinforcement to all ties at every intersection.

Mats: For bar reinforcement in the form of a mat, secure each bar at alternate intersections.

3.3 CONCRETE

General
General: Provide concrete in conformance with *Inhouse Engineers details and specification*

Elapsed delivery time
General: Make sure the elapsed time between the wetting of the mix and the discharge of the mix at the site conforms to the **Elapsed delivery time table**. Do not discharge at ambient temperature below 10°C or above 30°C unless approved heating or cooling measures are taken to deliver concrete within the range 5°C to 35°C.

Elapsed delivery time table

Concrete temperature at time of discharge (°C)	Maximum elapsed time (minutes)
10 – 24	120
24 – 27	90
27 – 30	60
30 – 32	45

Pre-mixed supply
Addition of water: To AS 1379 clause 4.2.3.

Transport method: Prevent segregation, loss of material and contamination of the environment, and do not adversely affect placing or compaction.

Site mixed supply
Emergencies: If mixing by hand, provide details.

Plant: Mix concrete in a plant located on the construction site.

3.4 CORES, FIXINGS AND EMBEDDED ITEMS

Adjoining elements
Fixings: Provide fixings for adjoining elements. If required, provide temporary support to the adjoining elements during concreting, to prevent movement.

Protection
General: Grease threads. Protect embedded items against damage.

Compatibility: Provide inserts, fixings and embedded items that are compatible with each other, with the reinforcement and with the documented concrete mix and the documented surface finish .

Corrosion: In external or exposed locations, galvanize anchor bolts and embedded fixings .

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Structural integrity
Position: Fix cores and embedded items to prevent movement during concrete placing. In locating cores, fixings and embedded items, displace but do not cut reinforcement, and maintain cover to reinforcement.

Isolation: Isolate embedded items to prevent water tracking to concrete providing minimum cover to reinforcement.

Tolerances
General: Maximum deviation from correct positions:

- Anchor bolt groups for structural steel: To AS 4100.
- Cores and embedded items generally: 10 mm.
- Other fixing bolts: 3 mm.

3.5 PLACING AND COMPACTION

Placing
Horizontal transport: Use suitable conveyors, clean chutes, troughs, hoppers or pipes.

Methods: Avoid segregation and loss of concrete, and minimise plastic settlement. Maintain a nominally vertical and plastic concrete edge during placement.

Layers: Place concrete in layers not more than 300 mm thick. Compact the following layer into previous layer before previous layer has taken initial set.

Compaction
Methods: Use immersion and screed vibrators accompanied by hand methods as appropriate to remove entrapped air and to fully compact the mix.

Vibrators: Do not allow vibrators to contact set concrete, reinforcement or items including pipes and conduits embedded in concrete. Do not use vibrators to move concrete along the formwork. Avoid causing segregation by over-vibration.

Placing records
Log book : Keep on site and make available for inspection a log book recording each placement of concrete, including the following:

- Date.
- Specified grade and source of concrete.
- Slump measurements.
- The portion of work.
- Volume placed.

Rain
Protection : During placement and before setting, protect the surface from damage.

Time between adjacent placements
General: As documented in the **Minimum time delay schedule.**

Vertical elements
Placement : Limit the free fall of concrete to maximum of 2000 mm.

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Placing in cold weather
Cement: Do not use high alumina cement.

Placing concrete: Maintain temperature of the freshly mixed concrete at 5°C or more.

Formwork and reinforcement: Before and during placing maintain temperature at 5°C or more.

Severe weather: If severe weather conditions are predicted, use high early strength cement.

Temperature control: Heat the concrete materials, other than cement, to the minimum temperature necessary so that the temperature of the placed concrete is within the documented limits .

Admixtures: Do not use calcium chloride, salts, chemicals or other material in the mix to lower the freezing point of the concrete.

Frozen materials: Do not allow frozen materials or materials containing ice to enter the mixer, and keep free of frost and ice any formwork, materials, and equipment coming in contact with the concrete.

Maximum temperature of water: 60°C when placed in the mixer.

Freezing : Prevent concrete from freezing.

Placing in hot weather
Handling: Prevent premature stiffening of the fresh mix and reduce water absorption and evaporation losses. Mix, transport, place and compact the concrete conforming to the **Elapsed delivery time table**.

Placing concrete: Maintain the temperature of the freshly mixed concrete conforming to the **Hot weather placing table**.

Evaporation control barriers: Erect barriers to protect freshly placed concrete from drying winds.

Formwork and reinforcement: Before and during placing, maintain temperature at 35°C or less.

Temperature control: Select one or more of the following methods of maintaining the temperature of the placed concrete at 35°C or less:

- Cool the concrete using liquid nitrogen injection before placing.
- Cover horizontal transport containers.
- Spray the coarse aggregate using cold water before mixing.
- Use chilled mixing water.

Hot weather placing table

Concrete element	Temperature limit
Normal concrete in footings, beams, columns, walls and slabs	35°C
Concrete in sections 1 m or more in all dimensions except for concrete of strength 40 MPa or more, in sections exceeding 600 mm in thickness	27°C

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Placing under water
General: Do not place under water unless conditions prevent dewatering.

Minimum cement content for the mix: Increase by 25%.

3.6 CURING

General
Requirements: Taking into account the average ambient temperature at site over the relevant period affecting the curing, adopt procedures to make sure of the following:

- Curing: Cure continuously from completion of finishing until the total cumulative number of days or fractions of days, during which the air temperature in contact with the concrete is above 10°C, conforms to the following, unless accelerated curing is adopted:
  - Fully enclosed internal surfaces/Early age concrete: 3 days.
  - Other concrete surfaces: 7 days.
- End of curing period: Prevent rapid drying out at the end of the curing period.
- Protection: Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period.

Curing compounds
Application: Provide a uniform continuous flexible coating without visible breaks or pinholes, which remains unbroken at least for the required curing period after application.

Substrates: Do not use wax-based or chlorinated rubber-based curing compounds on surfaces forming substrates to applied finishes, concrete toppings and cement-based render.

Self levelling toppings: If used also as curing compounds, conform to AS 3799.

Visually important surfaces: Apply curing compounds to produce uniform colour on adjacent surfaces.

Cold weather curing
Temperature: Maintain concrete surface temperatures above 5°C for the duration of the curing period.

Hot weather curing
Curing compounds: If curing compounds are proposed, provide details.

Protection: Select a protection method from the following:

- If the concrete temperature is more than 25°C or if not protected against drying winds, protect the concrete using a fog spray application of aliphatic alcohol evaporation retardant.
- If ambient shade temperature is more than 35°C, protect from wind and sun using an evaporative retarder until curing is commenced.
- Immediately after finishing, either cover exposed surfaces using an impervious membrane or hessian kept wet until curing begins, or apply a curing compound.

Water curing
Method: Select a method of ponding or continuously sprinkling to prevent damage to the concrete surface during the required curing period.

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3.7 FORMED SURFACES

General
Surface finish: Provide formed concrete finishes in conformance with the concrete formwork, to tolerance class A.

Damage: Do not damage concrete works through premature removal of formwork.

Curing
General: If formwork is stripped before the minimum curing period, for the concrete has elapsed, continue curing the exposed faces as soon as the stripping is completed.

Evaluation of formed surfaces
General: If evaluation of formed surface tolerance or colour is required, complete the evaluation before surface treatment.

Surface repairs
Method: If surface repairs are required, submit proposals.

3.8 UNFORMED SURFACES

General
Surface finish: As documented on the drawings and details

Finished levels: Strike off, screed and level slab surfaces to finished levels and to the flatness tolerance class documented.

Surface repairs
Method: If surface repairs are required, submit proposals.

Finishing methods – primary finish
Machine float finish:

- After levelling, consolidate the surface using a machine float.
- Cut and fill and refloat immediately to a uniform, smooth, granular texture.
- Hand float in locations inaccessible to the machine float.

Steel trowel finish: After machine floating finish, as follows:

- Use power or hand steel trowels to produce a smooth surface relatively free from defects.
- When the surface has hardened sufficiently, re-trowel to produce the final consolidated finish free of trowel marks and uniform in texture and appearance.

Wood float finish: After machine floating, use wood or plastic hand floats to produce the final consolidated finish free of float marks and uniform in texture and appearance.

Broom finish: After machine floating and steel trowelling use a broom or hessian belt drawn across the surface to produce a coarse even-textured transverse-scored surface.

Exposed aggregate finish:

- Provide an exposed aggregate finish by evenly sandblasting. Finish to match the approved sample panel. Refer to **Concrete Aggregates and Colour Selection Schedule**.
- Obtain the required finish without adversely affecting the other required concrete properties. Alternative methods of obtaining the exposed surface would be considered subject to review of the Contract administrator.

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- Protect surface of adjacent construction, including that by others, during sandblasting of concrete paving, Immediately after placement, spreading and compaction of the plastic concrete, start finishing operations including application of evaporation retarder MBT Masterkure IIICf or equal approved, applied to the manufacturer's recommendations.
- Prevent concrete and concrete dust from washing into landscape/garden/lawn areas. Remove washings from ground.

Drainage

Grade paving surface to fall evenly in direction indicated on the Drawings/Details, without ponding, to outlets or to edges. For nodes typically set falls of slab with only four spot heights, one at each corner, unless otherwise noted on the Drawings/Details.

Maintain the same finished level across junctions of different finishes. Deviation of the finished paved surface from its required form and without ponding.

3.9 COMPLETION

General

Generally leave paving finish clean and the site neat and tidy upon completion. At the completion of all construction wash all pavements to remove stains, laitance and the like, to achieve an even textured and uniform appearance concrete surface. Prevent any washed aggregate or wash from contaminating garden bed and planting areas.

Concrete will be rejected if any of the following defects are present in the finished work:

- It is porous, segregated or honeycombed.
- An expansion joint, longitudinal joint or decorative sawn joint has been made at a location or in a manner not in accordance with the drawings.
- The concrete kerb, edging or paving contains cracks exceeding 0.5mm in width at locations other than in expansion joint, longitudinal joint or decorative sawn joint locations
- The concrete is subject to spalling, fretting or craze cracking.
- The concrete is shown by the Contract administrator to be otherwise defective. When concrete work has been rejected it shall be removed from the works to the extent determined by the Contract administrator.
- It does not meet the minimum standard of the approved sample panel.
- More than 5% of Joints not meeting the required tolerances

Formwork removal

Extent: Remove formwork, other than profiled steel sheeting composite formwork and lost formwork, including formwork in concealed locations.

Timing: Do not disturb formwork until concrete is hardened enough to withstand formwork movements and removal without damage.

Stripping:

- General: To AS 3600 where it is more stringent than AS 3610.1.
- Post-tensioned concrete: Remove formwork supporting post-tensioned concrete members to AS 3600 clause 17.6.2.7.

Protection

General: Protect the concrete from damage due to construction loads, physical and thermal shocks, and excessive vibrations, particularly during the curing period.

Surface protection: Protect finished concrete surfaces and applied finishes from damage.

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4 SELECTIONS

4.1 SCHEDULES

Concrete aggregates and colour selection schedule

Landscape elements	Aggregate mix	Surface Applied aggregate	Oxide Colour (integrally mixed)	Oxide colour (surface applied)	Typical finish
Paving Type 1	10mm blue metal	None	None	n/a	Broom finish to edge over 50mm towelled trim on all edges of paving.
Paving Type 2	10mm	None	CCS BLACK 21 (Concrete colour system)	n/a	Broom finish to edge over 50mm towelled trim on all edges of paving.

HOLD POINT: Samples to be provided and approved before the commencement of work for both Paving type 1 and 2

Formwork dimensional deviation schedule

Dimension or measurement	Location or element	Deviation (mm)
Absolute position	Class 2 surface	15
Absolute position	Class 3 Surface	20

Surface finish class 2 formwork

Colour control: to match approved sample panel

Critical faces of elements: Visible faces

Distance between face steps (mm): to comply with Table 3.3.2 of AS3610.1

Formwork face span and direction of span (class 2 only): Provide details of proposed method.

Liner details, pattern and accuracy: Refer to table 3.3.1 of AS3610. Rebate on wall faces to be located plus or minus 10mm from designed position.

Surface pattern details and accuracy: Refer to table 3.3.1 of AS3610

Surface treatment of whole: Refer to Drawings and Details

Surface treatment pattern of part of surface: Not applicable

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Tie rod pattern: Align horizontally and vertically. Locate in formwork above top of wall or below ground level, or other non visible locations. Submit details of proposed locations prior to commencing formwork construction for approval. Where required, adjust form tie locations horizontally only to avoid formwork panel joints or other conflicts. Place at a Minimum spacing of 100mm from any joints.

Minimum time delay schedule

Between (pour locations)	Minimum period between adjacent pours (days)
Adjacent pours abutting horizontal construction joints in walls or columns	3
Retaining wall construction joints	3

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0315 SURFACE TREATMENTS

1 GENERAL

1.1 RESPONSIBILITIES

General
General: Provide surface materials as documented

Scope of Work
Undersurfacing will be installed in locations and areas as shown on the Drawings:

- Supply and installation of Paving Type 4 - Softfall
- Supply and installation of Sandpit sand
- supply and installation of drainage gravel and subsoil drain (below sand)

1.2 CROSS REFERENCES

General
Requirement: Conform to the following worksection(s):

- *General requirements.*
- *Landscape – Furniture and Fixtures*
- *Landscape – Softworks*

1.3 STANDARDS

General
- AS/NZ 4422 (1996) – Playground Surfacing: Specifications, Requirements & Test Method

1.4 SAMPLES
The Contractor shall provide samples for approval of the following softfall materials:

- 150mm x 150mm samples of rubber undersurfacing (wear layer) showing colours
- 1kg sample playground sand

1.5 INSPECTION

Notice – on site
Inspection: Give notice so that inspection may be made of the following:

- sub-base surfaces prior to application of roadbase
- sub-base with drainage in place
- installation of base layer
- layout of colour patterns sprayed onto their base layer
- drainage gravel in sandpit
- sand upon installation

Hold points
Inspection: Give notice so inspection may be made of the following:

- sandpit awaiting sand

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2 PRODUCTS

2.1 MATERIALS

Roadbase
Shall be recycled fine crushed concrete, free from foreign matter, with a maximum particle size of 20mm. Crusher dust can be used as an alternative, but only if the source and composition of the crusher dust is approved by the Superintendent.

Stablised Roadbase:
Shall comprise of approved roadbase stablised with 5% grey Portland cement by volume, if required.

Sand:
Shall be fine, double washed yellow dune sand (ex Williamstown), similar or equal to 'playground sand' as supplied by The Hills Garden and Landscape Centre (Tel: 9654 2288).

Particle and sieve analysis:

%passing 1.18mm 100%

%passing 0.60mm 99%

%passing 0.425mm 78%

%passing 0.3mm 22%

%passing 0.15mm <1%

%passing 0.075mm 0.2%

Shall be free of soil, stones, vegetative matter and any deleterious contaminants. A certificate of compliance of the above requirements shall be provided.

Drainage Gravel:
Gravel shall be 20mm diameter washed blue metal drainage aggregate. Nominated source and composition of product.

Geofabric:
Use polymeric fabric formed from a non-woven, needle punched, continuous filament, polyester yarn containing stabilisers or inhibitors to make the filaments resistant to deterioration due to ultraviolet light. Fabric to comply with AS3705 and AS3706.

Identification marking: AS3705

Protect fabric from long exposure to sunlight.

Softfall
Rubber Base Layer: Confirm requirement and depth of base layer with superintendent. Mix and apply base layer and primer to manufacturers specifications, with thickness and density as required to meet Australian standards and the stated free heights of fall on the drawings. The base layer is to be laid as a single monolithic surface with minimal joins. Avoid dry joins when laying. Once dry, mix

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MAINTENANCE LOG SHEET					
Company Name					
Client			Job No.		
Date			Contract No.		
Site Location					
Team Member					
Signature			Printed Name		
Item	**Description**	**Yes**	**No**	**Location**	**Comments**
1.0	**Maintained grassed areas**				
1.1	Mowing				
1.2	Watering				
1.3	Fertilising				
1.4	Pests, weeds and diseases				
1.5	Turf replacement / repair				
2.0	**Trees and garden beds**	Yes	No		
2.1	Watering				
2.2	Weeding / spraying as required				
2.3	Plant replacement / establishment				
2.4	Pruning				
3.0	**Native grasses**	Yes	No		
3.1	Watering				
3.2	Post planting maintenance / pruning				
3.3	Fertilising				
3.4	Spraying				
4.0	**Completion**	Yes	No		
4.1	All works completed to specific standards				
4.2	No materials or/equipment left on site				
4.3	Gates / access points secured as required				
4.4	Inform client of departure				
	Additional Comments / Other Works Completed				
Item	**Description**	**Yes**	**No**	**Location**	**Comments**

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• Ensure there are no sharp corners, or damage from Parkour use that may cause harm to the users

5.13 BASKETBALL AND NETBALL HOOP STRUCTURES

Repair and reinstatement

• Ensure all fixings are tight and posts and backboard firm
• Check for any vandalism affecting fixings or paint finish
• Replace any missing or damaged components as required

5.14 AFL MULTI-FUCTIONAL POSTS

Repair and reinstatement

• Ensure all fixings are tight and posts firm
• Check for any vandalism affecting fixings or paint finish
• Replace any missing or damaged components as required

5.15 SPORTS FIELD FENCE

Repair and reinstatement

• Ensure all fixings are tight and posts and panels firm
• Check for any vandalism affecting fixings or paint finish
• Replace any missing or damaged components as required

Weekly maintenance

• Trimming of turf around fence line

5.16 SHELTERS

Repair and reinstatement

• Ensure all fixings are tight and posts, roof structure firm
• Check for any vandalism affecting fixings or paint finish
• Replace any missing or damaged components as required

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5.6 SEATING AND TABLES

Carry out regular checks of seats and tables.

Repair and reinstatement

- Check that mountings for seats are firm
- Ensure all batten fixings are tight and battens firm
- Check for any vandalism affecting fixings or batten finish
- Replace any missing or damaged components as required

Annual maintenance

- touch up any chipping paint work to pedestals with paint as specified

5.7 CYCLE RACKS

The contractor shall compile on practical completion confirmation from furniture manufacturers in writing, that their equipment has been installed correctly. Manufacturer is to supply shop drawings/documents detailing ongoing maintenance requirements and replacement components for all furniture

5.8 BOLLARDS

Repair and reinstatement

- Check for any damage / displacement – bollards plumb and aligned
- Check for any vandalism affecting finish

5.9 LIGHTING

The contractor shall compile on practical completion confirmation from external 3rd party certifier in writing, that equipment has been installed correctly in accordance with current Australian Standards. Compliance certificates shall be provided to Penrith City Council, including requirements for ongoing maintenance and spare parts.

Routine maintenance

- Tighten all loose screws and bolts
- Ensure sleeve is free from debris

5.10 BBQ AREAS

Repair and reinstatement

- Ensure all fixings are tight and posts and panels firm
- Check for any vandalism affecting fixings or paint finish
- Replace any missing or damaged components as required

Note the panel system allows for replacement of individual panels should the need arise

Weekly maintenance

- Clean stainless steel bench tops
- empty fat / water containers
- Pressure hose down surrounding tile area

5.11 LITTER BINS

Repair and reinstatement

- Ensure all fixings are tight and panels firm
- Check for any vandalism affecting fixings or paint finish
- Replace any missing or damaged components as required

Weekly maintenance

- Once to Twice a week removal of all litter from all Village Oval litter bins

5.12 PARKOUR BARS

Repair and reinstatement

- Ensure all fixings are tight and posts and Concrete Blade wall firm
- Ensure all stainless steel bars are tightly fixed and that there is no sagging from Parkour use
- Check for any vandalism affecting fixings or paint finish
- Replace any missing or damaged components as required

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5.4 INSITU CONCRETE PAVEMENT AND PLEXIPAVE SPORTS COURT SURFACE

a) Preventative maintenance

Any defects to concrete paving and Plexipave should be repaired immediately to maintain a safe pedestrian surface and ensure the quality of finish is maintained. The following defects should be reported to the Director of Engineering Services immediately after they are detected:

A. Loose, chipped, cracked or broken paving/Plexipave
B. Any subsidence or buckling to paving/Plexipave
C. Damaged, missing or badly fitting services covers and grates
D. Staining or discolouration of paving/Plexipave
E. Ponding of surface stormwater
F. Graffiti or vandalism to paving/Plexipave
G. Problems related to service access to likely to cause a safety problem or damage paved surfaces.

Where any defects in the paving/Plexipave constitute a hazard to the public, the area concerned should be closed off with barriers as soon as the defects are observed, and arrangements made for their repair.

b) Cleaning and routine maintenance

1 Sweeping

Sweeping of all paved pedestrian and Plexipave areas to remove litter, leaves, and so on, as required to maintain a clean, safe pedestrian surface.

2 Cleaning

Spot clean major localised stains in paving by scrubbing with water and detergent as soon as staining appears. This is most important around street furniture where food and litter has been dropped. Avoid spraying tree pits, garden beds or street furniture items.

c) Repair and reinstatement

Any repairs or reinstatement of concrete shall integrate replacement of entire concrete area, to ensure integrity and appearance of jointing and overall pavement surface.

Any repairs to Plexipave Surface should be discussed with manufacturer and best practice adopted.

To reinstate all paving/Plexipave to a high standard finish, any trenching and excavation for services access should be carried out so as to minimise damage to the surrounding surface. For this purpose, the works specification should be issued to all service authorities and firms intending works.

The relevant service authorities should discuss their programme and construction requirements with Council's Engineering Services Department prior to the commencement of works on site.

5.5 CONCRETE WALLS

a) Preventative maintenance

Any defects to concrete walls should be repaired immediately to maintain a retention/free-standing structure and ensure the quality of finish is maintained. The following defects should be reported to the Director of Engineering Services immediately after they are detected:

A. Loose, chipped, cracked or broken concrete
B. Any subsidence or buckling
C. Staining or discolouration of surface
D. Graffiti or vandalism

Where any defects in the paving constitute a hazard to the public, the area concerned should be closed off with barriers as soon as the defects are observed, and arrangements made for their repair.

b) Cleaning and routine maintenance

1 Cleaning

Spot clean major localised stains in paving by scrubbing with water and detergent as soon as staining appears. This is most important where food and litter has been dropped. Avoid spraying tree pits, garden beds or street furniture items.

c) Repair and reinstatement

Any repairs or reinstatement of walling and shall integrate replacement of entire sections of wall as appropriate, to ensure integrity and appearance of jointing and structure.

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5 ONGOING (COUNCIL) MAINTENANCE

This section outlines ongoing maintenance works that will be taken over by Council at the completion of the on Contract maintenance period. The aim of these guidelines is to outline maintenance items that would be considered non-routine, requiring specific actions. As such items considered to be routine, such as mowing have not been included.

For Maintenance procedures refer also to the **Maintenance schedule**.

5.1 NATIVE GRASSES

Native grasses require little maintenance when compared to other plants, yet some care is needed to maintain their ornamental appearance and consistency of coverage.

Watering
Generally after handover to the ongoing maintenance contractor irrigation once a week should suffice although irrigation on an as needs basis over summer months.

Post planting maintenance (1-3 years):
Most native grasses should preferably not be pruned within a certain period after planting and establishment. This will ensure that plantings develop an optimum root structure, avoid potential infection following pruning, and maintain a consistent form and flowering pattern. It is recommended that the pruning requirements are assessed and tailored based on available resourcing and performance of planting.

Annual Pruning:
Whilst pruning is accepted as assisting retention of healthy foliage appearance – it is important not to over-prune. It is envisaged that the approach to pruning be tailored based on available resourcing and planting performance.

Herbicide Spraying:
Selective herbicides can be used in native grasses. It is important though NOT to use anything that contains Dicamba.

M.C.P.A, Bromoxinil (Bin-Die R) is recommended by native grass suppliers. Spray at recommended rates in Spring and Autumn. Avoid spraying in hot weather. Spot spraying with round-up should only be done with a wick wiper, not a Knapsack. Native grasses are very susceptible to Round-up spray drift.

As planting for weed control is a more effective approach than ongoing weed removal (as it is often impossible to keep weeds out of some types of native grasses) the native grasses have been planted on sites at the upper end of densities so that recurrent weed control requirements are aimed to be limited. (references: Abulk, Sydney www.abulk.com.au)

5.2 NATIVE TREE AND SHRUBS

Post-planting maintenance
Watering
No ongoing recurrent watering is to occur. Provide specific watering events during extended dry spells after completion of contract if weather conditions dictate.

5.3 DECIDUOUS TREES

Post-planting maintenance

Watering
No ongoing recurrent watering is to occur. Provide specific watering events during extended dry spells after completion of contract if weather conditions dictate.

Fertilizing
Fertilize only where inventory through general maintenance identifies poor condition.

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Item	Action
	Basketball and Netball poles and hoops
	AFL Multi-functional posts
	Sandstone Boulders
General	Cleaning of all Hardworks Landscape elements to remove stains, dirt, leaf litter, graffiti, seed stains etc.

4.2 MAINTENANCE PROCEDURE SCHEDULE

Maintenance schedule
Minimum attendance: Check list.

TASK	October to April	May to September
General mowing	Every 2 weeks	Every 5 weeks
Cutting of steep batters	Every 4 weeks	Every 8 weeks
Wedding of paved areas	Every 2 weeks	Every 5 weeks
Edging of pathways and kerbs	Every 4 weeks	Every 8 weeks
Weeding of gardens	On a request basis only	
Litter collection	Once or twice a week plus before and after mowing daily(weekdays only)	Once or twice a week plus before and after mowing daily (weekdays only)
Dumped rubbish removal	Before mowing	

4.3 VANDALISM

An effective reporting mechanism shall be established by the Contractor during implementation and maintenance, as well as by Contract maintenance staff employed by Council. Reporting shall:

- Immediately identify an issue including date, location and form of vandalism
- Suggest potential rectification works for Superintendent / Council approval

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Item	Action
Learn to Ride Track	Ensure that all sign structures are secure and in working order
	Prune and trim planting to boarders of concrete track
	Replacement of any damaged or stolen road signs
	Maintain defined edge between concrete track, mulch and turf
Parkour Area	Repair any damage to concrete walls, sandstone blocks, Parkour Bars and Timber Posts
	Remove of addition elements that may have been introduced by Parkour occupants
	Remove all stains and graffiti
	Replacement of Skate deterrent rods if removed
	Ensure that all structures are secure and in working order and pose no danger to the intended user
	Replace sand to maintain a consistent depth of 400mm.
	Remove all litter and animal excrement from the sand area
	Replace softfall mulch to a consistent depth of 300mm
	Trimming of turf with a "wiper snapper" around timber posts
	Maintain clean lines at adjoining surface materials. E.g. turf and softfall mulch.
	Prune and trim planting neighbouring Parkour walls. Plants to not exceed wall heights
Fitness Stations	Repair dips, hollows, irregularities in the softfall surfacing and concrete edging
	Ensure that all fitness equipment are secure and in working order
	Remove all stains and graffiti
Fencing	Repair fencing or replacement
	Trimming of turf around fence line
Site Landscape Concrete Walls (Amenities Block and ADIZONE)	Repair any damage to concrete walls
	Remove all stains and graffiti
	Encourage planting to grow up the Western face of the ADIZONE wall to provide screening and eliminate blind spots for surveillance
Shelters	Ensure that all Shelter structures are secure and in working order
	Remove all stains and graffiti
	General cleaning if required
Furniture and hard fixtures *(Repair, replacement, general cleaning, empty fat / water containers, pressure hose down surrounding areas, removal of stains and graffiti, ensure safe for the public).*	Seating
	Bollards
	Tables and Benches
	Bike Racks
	Handrails
	Boom Gates
	BBQ's
	Litter Bins

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4 SELECTIONS

4.1 MAINTENANCE REPORT SCHEDULE

Monthly reports schedule

Item	Action
Plant material	Replace failed plants
	Additional planting
	Treat for disease or insect attack
	Tree surgery
	Fertilising generally
	Fertilising for specific nutrient deficiencies
	Thin out planting
	Pruning/trimming
	Maintain sight lines internally and externally throughout the park for surveillance
Turf	Returfing
	Seeding
	Treat for disease
	Topdressing
	Weeding
	Mowing/trimming
Soil	Erosion/bank stabilisation
	Additional soil
	Soil conditioner
	Weeding
Mulch	Top up mulch
	Distribute mulch in an even manner. No excess mounding.
Rubbish removal	Generally remove bottles, paper, cigarette butts etc.
	Remove leaf, litter from path and paved areas
	Once to Twice a week rubbish removal from litter bins placed throughout Village Oval. Preferable scheduled after weekends when Oval will be at peak use
Irrigation	Replace parts
	Repair
	Clean out
	Adjust
	Clean out subsurface drains
Paving, pathways, Learn to Ride Track, Sporting courts (Basketball, Netball and Adizone).	Repair dips, hollows, irregularities
	Remove stains and graffiti
	Replace sections of uplift
	Line markings to courts and Learn to Ride Track. Repaint if line work fades or becomes not visible through public use.
	Clear main pathway drains of debris
	Weeding
	Clean seed stains
	Test against AS 4663

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- Without signs of having been stressed at any stage during their development due to inadequate watering, excessive shade/sunlight, suffered physical damage or have restricted habit due to growth in nursery rows.
- Healthy, well grown, hardened off specimens of good shape and free from pests and disease.
- Well rooted and without any indication of having been restricted (pot bound) or damaged at any time.
- Been grown in their final containers for not less than twelve (12) weeks.

3.4 WATERING

Lawn and planted areas
Generally: Maintain a vigorous healthy appearance.

Irrigation has been provided to the Village Oval Sports Field. To all other areas manual watering will be undertaken to ensure adequate watering programs to all maintained grassed areas. Provide water thoroughly and regularly after turf has been laid, to encourage a deep and vigorous root system. Once the root system has fully established, water thoroughly only when needed- when a slight wilting is visible, usually once per week in Summer, with much less or no watering in the cooler months.

Application rates: Soak to a depth of 150 mm for lawn and 300 mm for planting. Avoid frequent dampening of the surface. Allow the surface of the soil to partially dry out between waterings. Confirm soaked depth and record in the log book.

Timing: Water at times of day to minimise water evaporation loss. Do not water during the hottest period of Summer days.

Public areas without installed watering systems: Water only in excessive dry periods. Make available all necessary equipment to carry out hand and sprinkler watering as required.

Water restrictions: Coordinate the water supply and confirm the watering regime against federal and state government legislation and restrictions at the time.

Irrigation
Irrigation system program: Refer Irrigation Consultants specification.

Programming
Automated systems: Check that they are programmed to coincide with optimum periods of water pressure and water absorption.

Public access: Do not inconvenience persons occupying the site by water spray or block normal pedestrian or traffic flow. .

3.5 MULCHING

General
Clean up: Remove all mulching materials off lawn or paved areas and maintain a clean and tidy appearance when viewed on a weekly basis.

Depth: Maintain a minimum depth of:

- 75 mm for organic mulch.
- 300mm softfall mulch

Top up: Areas of excessive wear.

3.6 INCIDENTAL WORKS

Supplementary works
General: Execute the following:

- Removal of rubbish arising from maintenance work.
- Removal of leaf litter fortnightly during leaf fall.
- Wash paving on completion of herbicide application.

Drains
General: Inspect and clean all drainage structures and pit covers and ensure that they are in proper working order.

Frequency: As required so that all overflow drains are cleared when observed at fortnightly intervals

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Program: Spring and Summer and on a spot basis as required.

Hedge trimming: Schedule trimming at times which will maintain the character and design of hedges. Allow up to three times per season.

Tip pruning: Do not remove buds before the flowering season in those plants that have terminal flowers.

- Purpose: To encourage development of new shoots during the active growing season.
- Method: The removal of the top 25 mm or growing tip of each branch.

Radical pruning:

- Purpose: To maintain a hedge or formal shape or when a particular problem, growth habit, damage, or disease requires branch removal.
- Clear and keep clear vigorous groundcovers 200 mm from the base of any shrub or tree.
- Use only tools fit for purpose.

Trees: Prune to:

- Eliminate diseased or damaged growth, avoid inter-branch contact and thin out crowns in a natural manner.
- Maintain sight lines to signs and lights.
- Maintain visibility for personal security.

Tree branch removal:

- To AS 4373.

Fertilising

Fertilising program: Base the program on soil testing results.

Soil testing: Undertake soil tests as follows:

- At the commencement of the contract.
- Take samples from a cross section of planting beds.

Soil pH adjustment: Apply additional fertilisers and soil conditioners as indicated from soil testing or from the physical soil structure. Maintain a pH range of 5.5 – 6.5.

Shrubs:

- N:P:K ratio: Balanced 10:4:6.
- Rate: To the manufacturer's recommendation and cultivate two rows into the soil 100 mm deep.
- Regular application: Each September and March.
- Ensure the appropriate dosage for sensitive native species.

Trees:

- Fertiliser type: Agriform 10 gram N:P:K 20:4.3:4.1
- Application: Apply pill to the root zone at a distance from the trunk equal to the spread of the foliage. Make holes 400 mm deep to take the pill. Backfill with sand, equally spaced around the plant.

Micro nutrients: Apply 1 kg of urea in 20 litres of water per 100 m^2, through a hose proportioner every four weeks during Summer.

Stakes and ties

Generally: If plants are unable to be self-supported or if stakes are damaged, stake or restake the plants as follows:

- Drive three hardwood stakes placed obliquely with the first stake on the opposite side to the prevailing winds.
- Do not single stake large plants.

If plants are robust with well-developed systems and are strong enough to no longer require support, remove stakes and ties.

Plant replacements

General: Replace all evergreen plants that have died or lost 50% of their normal foliage cover.

Provide replacement plants as follows:

- Of the same species and variety and of the closest commercially available size.
- Of uniformly high quality stock equal to the best commercially available.
- Representative of optimum growth for the species as restricted by the container size.
- With a balanced root system in relation to the size of the plant and conducive to successful transpiration. Inspect the root conditions of plants by knocking plants from their containers.

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Apply:

- To the manufacturer's instructions and material data and safety sheets.
- When the weather is humid with moderate temperatures and maximum sunlight.
- When the ground has adequate soil moisture.

Pest and disease control

The contractor is responsible for the control of any pest or disease which may affect the lawn and garden bed areas.

Actions:

- Identify the problem.
- Execute the correct treatment until the problem has been eliminated.
- Apply hazardous material out of normal working hours.
- Protect staff and public.

3.2 LAWN

Mowing and trimming

Litter: Remove litter and fallen branches prior to mowing.

Height: A mowing height of approximately 50-65mm should be maintained in areas that are in full sun and not effected by shade or fall within high traffic zones. Mowing heights for shaded areas to be between 100-120mm.

Program: Weekly during the mowing season, November to March, and at bi-weekly intervals during April to October. Do not mow under wet conditions.

Raking: Once every month before mowing during the mowing season with a flexible rake. On alternate mowings, adopt a north-south and east-west pattern.

Edges: At the same time as mowing, trim lawn edges to plant beds, pathways, Parkour walls and timber posts, base of trees and other obstacles. Ensure trees and shrubs are not damaged.

Non-selective herbicide: Ensure application does not exceed the area limits of normal manual trimming. Repair all damage from overuse or over spray.

Fertilising

N:P:K (nitrogen:phosphous:potassium) ratio: Balanced 10:4:6.

Rate: To the manufacturer's recommendation.

Regular application: Each September and April.

Additional application: Each November and February at reduced rates.

Soil pH adjustment: Apply additional fertilisers and soil conditioners as indicated from soil testing or from the physical soil structure. Maintain a pH range of 5.5 – 6.5.

pH testing program: Two year schedule commencing in the first year of the contract.

Spreading:

- Dry: Crush lumps and broadcast dry material by hand or mechanically when the lawn is dry.
- Spray: Acceptable.
- Ensure fertiliser does not leach to adjoining planted beds particularly those with sensitive native trees and shrubs.

Topdressing

Topdressing material for established lawns: Weed free imported sandy topsoil to a depth of 5 mm.

Program: The spring following establishment.

Topdressing material for remediation of depressions or irregularities: Apply coarse or medium soil, to AS 4419, suitable for application to turf or grass seeded areas.

Renovation

Well established lawns of sandy soil profile: Renovate by dethatching or verti-cutting.

Program: In association with and prior to topdressing and fertilising procedures.

3.3 TREES AND SHRUBS

Pruning and trimming

General: Prune to reflect the natural growth flowering and regrowth habit of the individual species. Shrubs: Prune after flowering.

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Contractor and staff
Affiliation: Suitable professional qualifications acceptable to the principal.

Representative: Nominate a senior partner/personal experienced in maintenance nursery practices and horticulture, to be responsible for taking and carrying out instruction, and reporting to the principal.

Reporting
Monthly report: Submit regular reports by the last Friday of each month:

- Of the general status of works.
- Include soil test results as required for the fertilising programs.
- Plant replacement requirements.

Incident reports: Report immediately verbally and confirmed in writing any disturbance or incidence affecting or likely to affect the day to day scheduling of works.

Notice
Inspection: Provide two days' notice of the following operations:

- Application of herbicide.
- Application of fertiliser.
- Watering.
- Each site maintenance visit.
- Public amenity: Give notice of any work affecting public access or amenity on the Thursday of the week before the work is planned.

Log book
Records: Log the following on a weekly basis:

- Description, time and method of application of toxic material.
- Maintenance work details.
- Inclement weather to verify inability to carry out work within the specified time frame.

Availability: Upon request.

Disruption of works by others
Other contractors: Make arrangements to work around the disturbance.

Warranty
Parties: Supplier(s) to the principal.

Form: All the plants supplied under these works are true-to-species and type, and free of disease, fungal infection and/or any other impediment to their future growth and that they have been fully acclimatised for the conditions of the site.

Submission of warranty: At the time of each delivery.

Plant hire
Existing arrangements: Take responsibility for the re-hiring, installation, care and maintenance of all internal plant material currently under existing plant hire contract for the duration of the maintenance contract.

3 EXECUTION

3.1 GENERAL

Weeding
Weeds: Unwanted plants and grasses considered invasive to the locality.

Program:

- Lawns: Quarterly and as determined by the relationship of the general lawn condition and weed growth.
- Trees and shrubs: As required for planted, paved and mulched areas to be weed free when observed at bi-weekly intervals.

Method: Clear and keep clear vigorous ground covers 200 mm from the base of any shrub or tree:

- Small areas: By hand.
- Large areas: Proprietary herbicides.

Herbicide application: Avoid windy days or if rain is likely to follow within 12 hours.

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1424 LANDSCAPE – MAINTENANCE

1 GENERAL

1.1 INTRODUCTION

This maintenance manual sets out the scope of works for the requirement of 52 weeks post practical completion maintenance.

2

2.1 RESPONSIBILITIES

General

General: Provide landscape maintenance, as documented.

- Weeding of lawn, garden bed areas, and pavement.
- Supply and spreading of fertiliser to lawn, garden bed areas and pots.
- Supply and installation of mulch to existing garden bed areas.
- Pruning, trimming and tree surgery.
- Pest and disease control of lawn, shrubs and trees.
- Mowing and edge trimming to all lawn areas including collection and removal of clippings.
- Replacement of dead or failed plants.
- Maintenance of irrigation systems.
- Removal of rubbish and debris in garden areas.
- Keeping of a log book.
- Monthly reports.

Maintenance period: 52 weeks

Maintenance procedures: To the **Maintenance schedule**.

2.2 THE SITE

Record drawings

Availability: Jordan Springs Village Oval approved CC Documentation

Protection of persons and property

Temporary works: Provide and maintain required barricades, guards, fencing, shoring, temporary roadways, footpaths, signs, lighting, watching and traffic flagging.

Access ways, services: Do not obstruct or damage roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Determine the location of such services.

Property: Do not interfere with or damage property which is to remain on or adjacent to the site, including adjoining property encroaching onto the site, and trees.

Rectification

Access ways, services: Rectify immediately any obstruction or damage to roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Provide temporary services whilst repairs are carried out.

Property: Rectify immediately any interference or damage to property which is to remain on or adjacent to the site, including adjoining property encroaching onto the site, and trees.

2.3 GENERAL CONDITIONS

Contract

Form of contract: AS4921

Parties to the contract: The contractor and the principal.

Renegotiation: At the expiry of the contract and after reassessment of the specification.

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QUALITY CONTROL PLAN

REV	DATE	DESCRIPTION	CHECKED
01	17/10/14	Construction Certificate	JW-ED

1 COMMENTS

prepared by

CLOUSTON associates
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Please initial page to proceed with above changes or for approval with no additions.

Signature/s: _____ Dated: 17/10/14

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JORDANSPRINGS

CLIENT
LEND LEASE

Level 2, 88 Phillip Street
Parramatta NSW 2150

CLOUSTON associates

Jordan Springs Village Oval
Construction Certificate

LANDSCAPE MAINTENANCE OUTLINE

prepared by
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JOR-0003
Revision 01
Construction Certificate
17th October 2014

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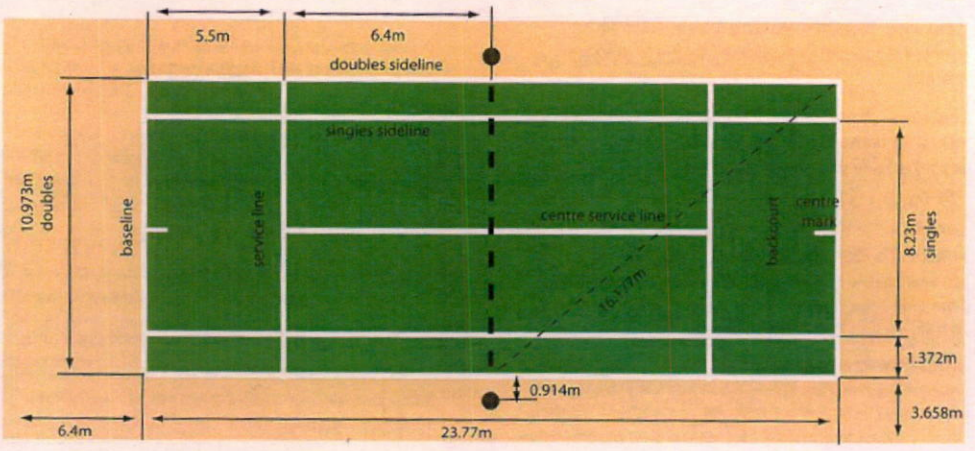
The following types of lighting systems are used for lighting outdoor tennis courts. Further technical information is available in Australian Standard 2560.2.1.

Lighting system	Description	Advantages	Disadvantages
Side lighting	four or six poles adjacent to sides of the court	less glare, lower poles, easier to control spill light	pole locations if more than one court is to be lit
Corner lighting	only four luminaires are used situated at each corner of the court	high level of illuminance on ball surface, suitable for two or more courts where limited room is available between courts	glare from luminaires, higher poles, difficult to control spill light
Hybrid lighting	combination of side and corner lighting on a multi-court installation	less glare, lower poles, easier to control spill light	not suited to the use of side or corner lighting fittings

Diagram of a tennis court



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49. TENNIS

Tennis is a game played between either two players (singles) or two teams of two players (doubles). Players use a stringed racquet to strike a hollow rubber ball covered with felt over a net into the opponent's court so that they fail to return the ball.

The court

The court is a rectangle, 23.77m long and for singles matches, 8.23m wide. For doubles matches, the court is 10.97m wide.

The court is divided across the middle by a net suspended by a cord or metal cable attached to two net posts 1.07m high. The net is fully extended and small enough mesh so a ball cannot pass through it. The height of the net is 0.914m at the centre, where it is held down tightly by a white strap. A white band covers the cord or metal cable and the top of the net.

For doubles matches, the net posts are 0.914m outside the doubles court on each side. For singles matches the centres of the net posts are 0.914m outside the singles court on each side.

Line markings

All court measurements are made to the outside of the lines and all lines of the court are the same colour clearly contrasting with the colour of the surface.

Baselines are lines at the ends of the court. Each baseline is divided in half by a centre mark, 10cm long and parallel with the singles sidelines. The baseline is up to 10cm wide.

Sidelines are the lines at the sides of the court.

Service lines are two lines between the singles sidelines 6.40m from each side of the net, parallel with the net.

The centre service line is on each side of the net.The area between the service line and the net is divided into two equal parts by the centre service line and is called the service courts. The centre service line is parallel with the singles sidelines and halfway between them. The centre service line and centre mark is 5cm wide.

Space around the court

For international competitions, the minimum distance between baselines and backstops is 6.4m. The minimum distance between side lines and sidestops is 3.66m.

For recreational and club play, the minimum distance between baselines and backstops is 5.48m. The minimum distance between sidelines and sidestops is 3.05m.

The minimum height to the ceiling is 9.14m for indoor tennis. Where courts are constructed within the confines of a common enclosure, the distance between sidelines is not less than 3.658m.

Court surfaces

There are several types of courts depending on the materials used for the court surface. Each playing surface has its own unique characteristics which affect the playing style of the game. The table below identifies generic court surfaces type and description as provided by the International Tennis Federations (ITF).

Type of surface	Description
Acrylic	textured, pigmented, resin-bound coating
Artificial clay	synthetic surface with the appearance of clay
Artificial grass	synthetic surface with the appearance of natural grass
Asphalt	bitumen-bound aggregate
Carpet	textile of polymeric material supplied in rolls or sheets
Clay	unbound mineral aggregate
Concrete	cement-bound aggregate
Grass	natural grass
Other	modular systems (tiles), wood, canvas

Lighting

The fundamental requirement of a tennis lighting installation is the control of the brightness of the ball and the background against which it is viewed. The ball must be visible regardless of its location and speed. The Australian Standard for outdoor tennis courts for recreational and residential is 250 lux, club competition and commercial 350 lux and national and international 1000 lux. It is recommended that floodlights be installed at a minimum of 6m for residential and recreational and 8m for club competition and above.

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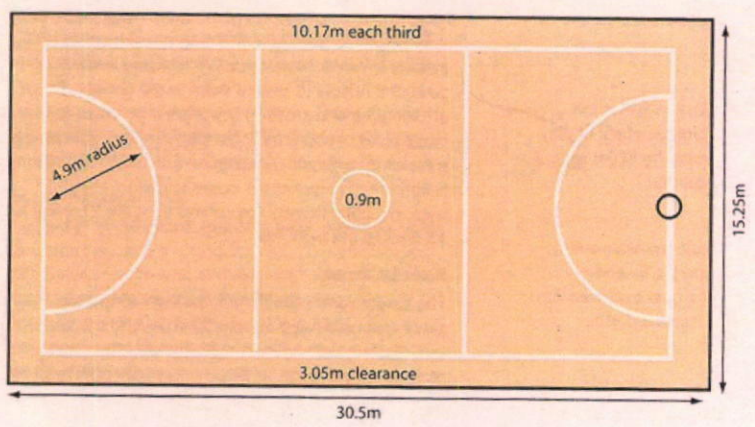
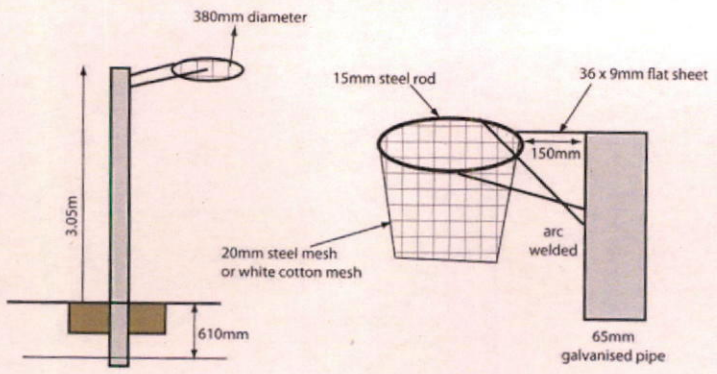
Netball court



Goal post specifications



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37. NETBALL

SENIORS

Netball is an international sport and played by two teams of seven players, based on throwing and catching. The object is to score goals from within a defined area by throwing a ball into a ring at one's own end of the court.

Netball is played on a firm surface, both indoor and outdoor. The court is divided into three equal parts – a centre third and two goal thirds measuring 10.17m each.

Court dimensions

- 30.5m long and 15.25m wide. The longer sides are called sidelines and the shorter sides are called goal lines
- The court is divided into three thirds measuring 10.17m each
- Centre circle is 0.9m in diameter in the centre of the court
- Goal circle is a semi-circle 4.9m in radius and its centre is the mid-point of the goal line
- Ceiling height — minimum of 8.3m
- Line markings — all lines are part of the court and no more than 50mm wide
- Gradient is one per cent cross fall in both directions

Goal posts

- Post height is 3.05m and placed at the midpoint of each goal line
- Post diameter — standard 65mm. If padding is used on the goal post, it must not be more than 50mm thick and start at the base of the goal post and extend between 2m and 2.4m up the goal post
- Ring is 380mm internal diameter and made of a 15mm steel rod fitted with a net clearly visible and open at both ends. The ring extends 150mm from the top of the goal post
- Net is approximately 20mm steel mesh or white cotton mesh
- Post fixing (internal) — there are no struts from ring to goal post. The post is inserted in a socket in the ground or supported by a metal base that does not project onto the court

Run-off

There is a minimum run-off space of 3.05m outside each sideline. Other recommended run-off spaces are as follows:

- goal lines 3.05m
- to wall/seating 3.05m
- between courts 3.65m

Lighting

In a netball game players move around the court in all directions and are required to look virtually in all directions, not only at eye level but also upwards. During play the ball may be thrown up to 8m high. The player must be able to follow the flight of the ball and actions of other players over the entire court area. Although the ball is large, action is fast and relatively high illuminances are required.

The minimum Australian Standard for indoor netball courts is 700 lux–800 lux. The minimum Australian Standard for outdoor netball courts is 100 lux for recreational or training level and 200 lux for competition level. Pole heights are from 8m to 12m.

Generally, a side lighting system is used for outdoor courts, whether they be in a single court or multi-court complex. Side lighting gives better control of spill light outside the playing area and is more economical for one or two courts. Corner lighting is not recommended because of unavoidable glare when shooting for goal.

NETBALL – NETTA

NETTA netball is the modified game of netball for 8–10 year old boys and girls. It is played on a standard netball court but the goal posts are 2.4m high. The players also use a smaller ball.

FUN NET

FUN NET is a play based motor skills program for 5–7 year olds. The emphasis is on the acquisition of basic motor skills, in a fun environment of games and activities. There is no organised competition structure and modified equipment is used.

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Three point field goal area and line

The three point field goal area is the entire floor area of the playing court, except for inside the three point line near the opponents' basket. The three point line is generally an arc at a set radius from the basket. The three point line is 6.25m from the basket. The three point line is straight and parallel to the sideline in order to allow room between the three point line and the sideline.

From 1 October 2010, for high level competitions (Olympic and World Championships), the distance of the three point line is 6.75m. For medium level competitions (National Championships), this rule change comes into effect as at 1 October 2012.

Free throws and restricted areas

A free-throw line is drawn parallel to each endline. Its furthest edge is 5.8m from the inner edge of the endline and is 3.6m long. Its mid-point lies on the imaginary line joining the midpoints of the two endlines.

The restricted areas are marked on the playing court, limited by the endlines, the free-throw lines and the lines that originate the endlines, their outer edges 3m from the mid-points of the endlines and terminating the outer edge of the free-throw lines. These lines, excluding the endlines, are part of the restricted area. The inside of the restricted areas can be painted but must be the same colour as the centre circle.

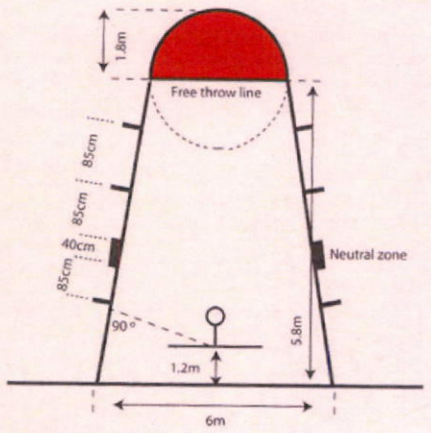
From 1 October 2010, for high level competitions (Olympic and World Championships), the restricted areas shall be the four rectangle areas marked on the playing courts. The restricted (three-second area) will be a rectangle (not a trapezoid). For medium level competitions (National Championships), this rule change comes into effect as of 1 October 2012.

Rebound places along the restricted areas, reserved for players during free throws, are marked in the following diagram.

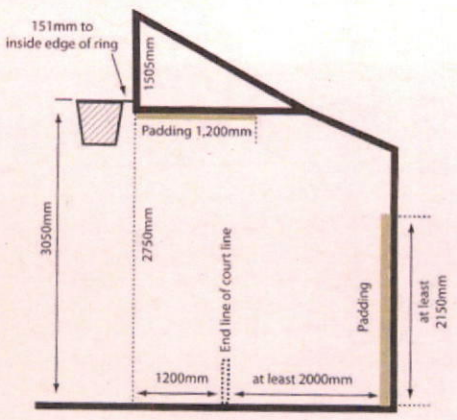
Backstop unit

There are two backstop units, one placed at each end of the playing court and each consisting of the following parts:

- 1 x backboard
- 1 x basket ring with a ring mounting plate
- 1 x basket net
- 1 x basket support structure
- padding.



Free throw and restricted area



Backstop unit

The following safety issues need to be taken into account when constructing a backstop unit:

- break-away rims installed on glass backboards
- the bottom of the backboard is padded
- walls and poles beneath backboards are padded, at least (100mm)

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12. BASKETBALL

SENIORS

Basketball is played by two teams of five players each. The aim of each team is to score in the opponent's basket and to prevent the other team from scoring.

Court dimensions

The playing court is a flat, hard surface free from obstructions with dimensions of 28m long by 15m wide, measured from the inside edge of the boundary line.

The Australian Basketball Federation (ABF) has the authority to approve, for their competitions, existing playing courts with minimum dimensions of 26m long by 14m wide.

The height of the ceiling or the lowest obstruction above the playing floor is at least 7m.

Lines

All lines are drawn in the same colour (preferably white), 5cm in width and clearly visible.

Boundary line

The playing area is limited by the boundary line, usually called baselines (on the short sides) and the sidelines (on the long sides). These lines are not part of the playing court. The minimum space around the court for run-off is 2m. Any obstruction, including seated team bench personnel, must be at least 2m from the playing court.

All spectators must be seated at a distance of at least 5m from the outside edge of the boundary lines of the playing court.

From 1 October 2010, for high level competitions (Olympic and World Championships), there will be two small lines marked outside the court, on the opposite side of the scorer's table and the team bench areas. The outer edge is 8.325m from the inside edge of the endlines and level to the top of the three-point line. For medium level competitions (National Championships), this rule change comes into effect as at 1 October 2012.

Centre line, centre circle and semi-circles

The centre line is marked parallel to the endlines from the mid-points of the sidelines. It extends 15cm beyond each sideline.

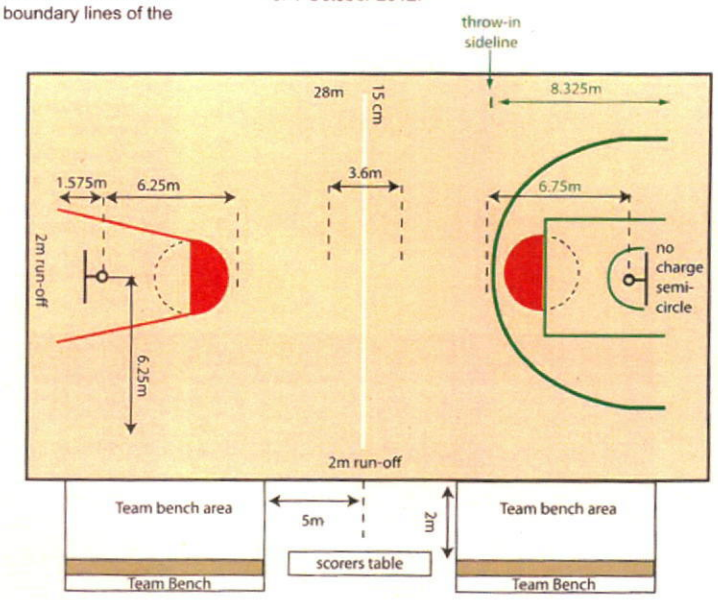
The centre circle is marked in the centre of the playing court and has a radius of 1.8m measured to the outer edge of the circumference.

The semi-circles are marked on the playing court with a radium of 1.8m measured to the outer edge of the circumference and with the centre at the mid-points of the free-throw line.

From 1 October 2010, for high level competitions (Olympic and World Championships), there will be no-charge semi-circles marked on the playing court under the baskets. The distance of the inner edge of the semi-circles is 1.25m from the centre of the basket (on the floor). For medium level competitions (National Championships), this rule change comes into effect as of 1 October 2012.

Basketball court layout

(markings in green are changes from 2010 onwards)



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0671 COURT MARKINGS

1 GENERAL

1.1 RESPONSIBILITIES

General

All sport courts (ADIZONE, Basketball and Netball court) line markings to be setout and painted to the following typical standards. Paint type and application as recommended by Plexipave court surfaces.

The following page inserts of sports court dimensions have been directly referenced from the report:

Sport Dimensions Guide for Playing Areas

Sport and Recreation Facilities

July 2008

A guide for planning, designing and marking out sport playing areas

Department of sport and recreation

Government of Western Australia.

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loose ends. Ensure overlaps are fixed with 'U'-shaped staples into position, so that children cannot pull the fabric up through the sand. Cut fabric to suit posts and footings in the sandpit.

Once sandpit concrete and drainage works are complete the sand itself can be installed. Fill sandpit to a minimum depth of 400mm in layers 200mm thick, and water-in each layer. Maintain sand to this level up to Practical completion. Sift out leaves, debris and deleterious materials from the sand. Sweep up spilt sand around sandpit.

2.3 TESTING AND CERTIFICATION

The Contractor shall verify in writing that the softfall surfaces as specified have been installed to the required depths in the Playground.

Drop Height Tests will be undertaken at the Superintendent's discretion.

Certificates of Compliance with current Australian Standards shall be made in Council's name.

The Certificate shall state that the approved and installed softfall surfaces will satisfy the impact attenuation requirements of AS4422: 1996 up to the stated critical fall heights when installed, well drained, and maintained to the required depth.

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and apply wear layer and primer over base layer, in accordance with manufacturers recommendations.

Rating of Rubber: Install the rubber wetpour to a minimum thickness that ensures the gmax is limited to less than 200g and the HIC is limited to 1000 when tested from the stated free height of fall of each item of playground equipment, as shown on the Drawings.

Rubber Layer: Mix and apply wetpour rubber wear layer and primer directly over dry prepared surfaces, to Manufacturer's recommendations, with thickness and density required to meet Australian Standards, and the stated free heights of fall on the Drawings. Each colour of rubber shall be installed as a single cold wet poured monolithic surface with no joins. Joins are unacceptable in one area of colour. Take particular care to install the rubber layer when temperatures and weather are favourable. Follow Manufacturer's recommendations as regards ideal humidity and temperature ranges. An allowance of time should be made for reasonable curing time given the humidity and ambient temperature of the day. Thermal contraction surface cracks (TCSC) will not be accepted during the contract, including the Establishment Period. The Standards or develops TCSC.

Joins between Colours: Curved patterns shall be laid out for approval prior to Colour 1 being laid. Provide a "Z" join between colours of rubber wear layer, as detailed in the Drawings.

Colour 1 shall be allowed to cure before Colour 2 is added. Rubber footprints can be laid using a template or mould, but the template must also have a Z join. Adjoining colours shall be laid to be flush. Apply binder liberally at joins to ensure lasting adhesion between colours.

'Toes' at Adjoining Edges: Provide a 'toe' where rubber undersurfacing adjoins other materials and surfaces, as detailed in the Drawings. The 'toe' shall be a minimum of 100mm in width, and a minimum 70mm in depth. Locally excavate compacted roadbase to achieve 'toe'.

Supplier: OZ North Enterprises or approved equivalent. Colour COCOA

2.2 UNDERSURFACING

Subgrade:
Establish required reduced levels to all areas requiring undersurfacing and ensure subgrade is compacted to a minimum of 98% of the maximum dry density, as determined in the laboratory by the Standard Compaction Test AS1289 – E1.1. Provide 2% falls towards trenches with agricultural pipes and sub-surface drainage pits.

Drainage to Equipment Areas:
Ensure all equipment areas are free draining.

Sandpit Preparation:
Excavate sandpit to achieve an overall gravel layer of 100mm, and a sand depth of 400mm. Fall the sandpit base to the junction pit (minimum 2% falls).

Lay geofabric over the sandpit base. Overlap panels of geofabric generously. Lay drainage gravel 100mm thick on top of geofabric. Wrap geofabric around and over the drainage gravel, and secure

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