



**TWEED**  
SHIRE COUNCIL

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**COMMUNITY AND NATURAL RESOURCES –  
RECREATIONAL SERVICES UNIT**

**Document:**

**IRRIGATION ASSETS SPECIFICATION**

**Reference #: TSC-EO-P-IAS-01**

**Application:**

**IRRIGATION STANDARDS FOR DEVELOPMENT OF  
PUBLIC OPEN SPACE PROJECTS**

**TO BE MANAGED & MAINTAINED BY TWEED SHIRE COUNCIL**

**Scope:**

**SPECIFICATION FOR DESIGN, SUPPLY, INSTALLATION,  
COMMISSIONING, UPGRADE &/OR MAINTENANCE  
OF IRRIGATION WORKS**

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## A. Document Management

### 1. Revision Log

- 1.1 This is a controlled document and may not be changed without authorization of the Tweed Shire Council Recreational Services Unit, Parks Asset Supervisor.
- 1.2 Formal revisions shall be distributed to Tweed Shire Council Planning, Development Engineering and Operations department managers, Building & Recreational Assets Coordinator and Irrigation Assets Foremen.
- 1.3 This document shall be registered with Development and design specification and referenced from TSC DCP Section A5-Subdivision Manual.
- 1.4 Contact details are;
  - Contact: Parks Asset Supervisor, TWEED SHIRE COUNCIL
  - Address: Civic & Cultural Centre, Tumbulgum Road, Murwillumbah. NSW. 2484
  - Postal: PO Box 816, Murwillumbah. NSW. 2484
  - Phone: (02) 6670 2400
  - Fax: (02) 6670 2429
  - Email: [tsc@tweed.nsw.gov.au](mailto:tsc@tweed.nsw.gov.au)
- 1.5 Revision log below;



## 2. Document control

- 2.1 The continuance and distribution of this document is the responsibility of the Tweed Shire Council Parks Asset Supervisor and may not be altered without express permission of the Parks Asset Supervisor

## 3. Intellectual property

- 3.1 This document and intellectual remains the property of the Tweed Shire Council's originating consultant and may not be distributed, sold, replicated or modified for commercial purposes in any way without written permission by TSC irrigation consultant.

## **B. Introduction**

### 4. Introduction

- 4.1 This specification establishes a standard for all irrigation assets or works carried out within the Tweed Shire Council region for works carried out on public property that is, or shall eventually be, managed and maintained by the Tweed Shire Council.
- 4.2 The Tweed Shire Council provides for sustaining public areas that benefit the community and environment by using efficient irrigation systems and implement responsible water management practices.
- 4.3 The requirement of areas to be irrigated may be site specific, refer 'Extent of Irrigated Areas' section below

### 5. Extent of Irrigated Areas

- 5.1 Applies to any irrigation asset or works that is or shall be managed by TSC, including:
  - All public sports turf surfaces.
  - Public parks, recreation facilities, council building surrounds and memorial facilities.
  - Road reserves and streetscapes particularly feature gardens and high traffic turf areas.
  - Renovations and upgrades for above.
- 5.2 As directed by TSC development, planning and building guidelines, approval permits &/or DCP-A5.
- 5.3 As directed by TSC Parks Asset Supervisor or their representative.

### 6. Tweed Shire Council boundary map

- 6.1 Refer map below





Tweed Shire Council  
Boundaries  
**Pic 6.1**

## C. Preliminaries

### 7. Scope of Irrigation Specification

- 7.1 The scope of this irrigation specification applies to the design, supply, installation, commissioning and maintenance of irrigation systems for parks, sports fields, building surrounds and public open spaces that are now, or shall be managed by TSC Engineering & Operations, Recreational Services Unit.
- 7.2 Substitution of proprietary products will not be accepted without prior written approval from TSC Parks Asset Supervisor. Some proprietary products provide for multiple brands or models. Non-proprietary products shall normally include wording, 'or equal'. Products not specified must be of high quality, fit for purpose and where applicable meet relevant Australian or ISO manufacturing standards.
- 7.3 For items not included or provided for in this specification, installation details &/or product specifications shall be required to be submitted for approval by the Parks Asset Supervisor.

### 8. Irrigation values

- 8.1 Protect community investment by maintaining Tweed Shire Council parks, recreational grounds and gardens in good condition
- 8.2 Utilize irrigation assets and parks resources to have a positive environmental impact
- 8.3 Demonstrate water conservation by excellence in irrigation design and operational practices
- 8.4 Enhance public open spaces for the benefit of residents and community
- 8.5 Provide quality safe sports turf surfaces for the sporting community
- 8.6 Encourage recreation activities by providing functional open spaces
- 8.7 Support regional tourism efforts by providing attractive parks and facilities
- 8.8 Facilitate education of shire staff and progress communication with community facility users in the responsible use of water for irrigation purposes.

**Irrigation Values – TSC RSU Community Facilities**

Jack Evans Boat Harbour  
**Pic 8.1.1**



Stan Sercombe Oval  
**Pic 8.1.2**

Murwillumbah Lawn  
Cemetery  
**Pic 8.1.3**



**Parks – Sports – Memorials – Recreational Spaces – Public Buildings - Environment**



**Irrigation Values – TSC RSU Community Facilities**

Jack Baylis Park  
Pic 8.1.4



Murwillumbah Civic  
Centre  
Pic 8.1.5

Walter Pete Sports Field  
Pic 8.1.6



**Parks – Sports – Memorials – Recreational Spaces – Public Buildings - Environment**

## 9. Irrigation priorities

- 9.1 Set effective standards in irrigation system quality, performance & efficiency
- 9.2 Implement effective irrigation water management programs and irrigation system integration via PC based central control with GSM remote site communications.
- 9.3 Utilize environmental sensor devices to facilitate accurate determination of irrigation requirements.
- 9.4 Consistency of irrigation control systems and key components to facilitate management and ease of maintenance.
- 9.5 Upgrades or renovations of existing irrigation assets, particularly larger parks and sporting facilities with high water usage requirements.
- 9.6 Monitor Tweed Shire Council parks irrigation flows and water use budgets.
- 9.7 Provide effective ongoing system maintenance

## 10. Irrigation processes and flow chart

- 10.1 Refer Appendix A for process flow chart
- 10.2 Refer Appendix C for standard forms & checklists

## 11. Definitions or Abbreviations

- 11.1 Australian Standard issued by Standards Australia: AS
- 11.2 Tweed Shire Council: TSC
- 11.3 Recreational Services Unit: RSU
- 11.4 Parks Asset Supervisor or nominated representative: PAS
- 11.5 Main contractor: developer, project manager or principal contractor pending contractual arrangements that may be specific to a project
- 11.6 Contractor: Irrigation sub-contractor or contractor
- 11.7 Original equipment manufacturer: OEM
- 11.8 Irrigation Australia: IAL
- 11.9 IAL Certified Irrigation Designer: CID

## 12. Disclaimer

- 12.1 Use of this specification, products or equipment does not negate the designer, contractor or manufacturer's warranty and responsibilities.

#### **D. Technical Design, Standards & Drawings**

##### 13. Technical Contacts

- 13.1 All irrigation specification enquires may be directed to;

- TSC Parks Asset Supervisor
- Phone: (02) 6670 2400
- Email: [tsc@tweed.nsw.gov.au](mailto:tsc@tweed.nsw.gov.au)

##### 14. Irrigation design

- 14.1 For TSC RSU projects a design may be provided by TSC Engineering & Operations, Parks Asset Supervisor.
- 14.2 For design & construct type contracts, all irrigation design work must be carried out by a Certified Irrigation Designer (CID), endorsed by Irrigation Australia Limited, with appropriate experience and qualifications for the scale of project. The TSC Parks Asset Supervisor may request references of similar size projects to pre-qualify irrigation designer.
- 14.3 The irrigation design intent shall be to consistent with industry best practices to provide efficient use of water, power, labour & maintenance inputs.
- 14.4 The irrigation design shall incorporate the use of proprietary products and equipment contained in this specification. Alternative products recommended by the designer for specific applications may be submitted to the TSC Parks Supervisor with supporting specification data and justification.
- 14.5 Turf areas shall be irrigated using popup (min 100mm) spray or rotary sprinklers of appropriate size for the scale of area and minimizing potential for overspray.
- 14.6 Gardens and planted areas shall be irrigated using popup (300mm) spray or rotary sprinklers of appropriate size for the scale of area and minimizing potential for overspray.
- 14.7 Target Scheduling Co-efficient is  $\leq 1.2$  and shall not exceed 1.4
- 14.8 The sprinkler spacing shall be no greater than radius (head to head) in planted areas and low traffic turf areas.
- 14.9 The sprinkler spacing in sports turf shall be no greater than 90% radius.

- 14.10 For large radius turf rotors spaced greater than 15m is undesirable to mix full circle and part circle sprinklers, and may not be allowable on sports turf surfaces if part circle sprinkler radius or scheduling coefficient does not meet requirement.
- 14.11 Sprinklers on a common valve or station shall have matched precipitation rates. Sprinklers or emitters with dissimilar precipitation rates must not be mixed together on common valve or station.
- 14.12 The sprinkler pattern may be square or triangular. Single row pattern may be allowable for long narrow areas less than 1.5m wide, provided precipitation rates are consistent and satisfactory coverage is achieved. Single row sprinklers must be on separate station.
- 14.13 Design irrigation requirements, based on peak season, assumes no rainfall:
- Landscape & low traffic turf areas 32mm/week
  - Sports turf surfaces & sandy profiles 38mm/week
- 14.14 Available irrigation time window:
- 56 hours/week 10pm to 6am, every night
  - Specific areas or projects may have custom times, refer TSC PAS
- 14.15 The irrigation hydraulic design shall ensure uniform and adequate pressure to all emitter outlets for optimum performance. Pipe flow rates shall not exceed guidelines for maximum pipe velocities & flows– refer Appendix.
- 14.16 The irrigation electrical control cable shall ensure adequate voltage to all automatic control valves. Voltage drop shall not exceed AS3000 or guidelines for maximum ULV cable runs – refer Appendix.
- 14.17 Automatic control valve flow rates shall not exceed guidelines for maximum solenoid valve flows– refer Appendix.
- 14.18 Automatic control valves shall have pressure regulation. Control valves zones shall have similar topographic levels within the valve zone, where topography levels are in excess of +/-2m, or 10% of the sprinkler design pressure, individual pressure regulation of the sprinkler is required either at the nozzle or fitted to sprinkler base.
- 14.19 Whilst popup irrigation is preferred for both turf and planted areas, drip tube irrigation may be considered for areas where overspray or other issues may present a risk. The irrigation designer should include brief statement with approval application outlining recommendation for

drip irrigation. In specific cases the TSC Parks Asset Supervisor may require drip tube irrigation.

14.20 The irrigation design may need to allow spare capacity to cater for future stages or link adjoining to adjoining parks, where applicable.

14.21 The irrigation design must be submitted 5 working days for approval by the TSC Parks Asset Supervisor prior commencement of irrigation installation. Acceptable format for approvals are A3 pdf or A1/A3 paper copy. The pre-start meeting may be scheduled prior to design upon request.

## 15. Drawing Standards

15.1 Base drawings with survey information, services and surface treatments shall normally be provided in AutoCAD format by the developer, principal contractor or project manager, unless otherwise specified in the contract.

15.2 The irrigation design drawings must be generated in AutoCAD or compatible format. The software version shall be recent edition & no older than 5 years.

15.3 The paper space scaling must allow for reasonable clarity and drawing interpretation. As a guide allow up to 1:250 for small or complex projects, and up to 1:500 for large or open spaces on full scale sheet. Where multiple sheets are required a master sheet shall be provided with a drawing schedule keying sheet numbers with adjoining sheets.

15.4 The drawing size may be A3, A1 or A0 pending on the scale of project.

15.5 The drawing must included a title block, legend, sheet size, scale bar, north pointer, project name, drawing title, drawing number, issue dates, revision number, CID number and contractor contact details.

15.6 The drawing legend shall list all irrigation pipes and key components shown on drawing.

15.7 The drawing shall notate peak irrigation duty required, pressure and flow as a minimum.

15.8 For clarity cable routes are optional where in common trench with mainline providing controllers and valves are cleared coded, with supporting drawing notes or table of cable type, sizes and number of cores. Spare wire valve box locations must be noted on drawings.

15.9 All key components shall be created in separate CAD layers with logic coded layer names, including but not limited to:



- Text
  - Dimensions
  - External references
  - Controllers
  - Pumps
  - Cables
  - Pipe, each size
  - Valves
  - Irrigation emitters
  - Hard surfaces
  - Structures
- 15.10 For special components or custom arrangements not provided for in this specification, such as tanks or pump station, a construction detail drawing shall be required for approval by Parks Asset Supervisor.
- 15.11 All drawings shall include a plot file plus relevant external references.
- 15.12 When plotting to paper or pdf format do not 'scale to fit', all drawings must be either full scale or 50% reduction.
- 15.13 Drawings must be legible when plotted in black and white. Concept drawings or sketches may be presented in color for preliminary planning purposes. Color may be used provided there is clarity when copied by using most definite colors, and avoid using light colors such as yellow.
- 15.14 The preferred black pen sizes for lines or hatching are as follows;
- |          |         |    |
|----------|---------|----|
| • 0.2mm  | Cyan    | #4 |
| • 0.25mm | White   | #7 |
| • 0.3mm  | Green   | #3 |
| • 0.35mm | Yellow  | #2 |
| • 0.4mm  | Magenta | #6 |
| • 0.5mm  | Red     | #1 |
| • 0.7mm  | Blue    | #5 |

15.15 Line types & line scales shall allow reasonable clarity of pipe, cable and key components plus be consistent with legend scaling when plotted.

15.16 The preferred black pen sizes for text are as follows;

- 2mm Cyan #4
- 2.5mm White #7
- 3mm Green #3
- 3.5mm Yellow #2
- 4mm Magenta #6
- 5mm Red #1
- 7mm Blue #5

## 16. Standards & Reference Information

16.1 All materials and work to be carried out in accordance with:

- Australian Standards including:
  - AS 4300 General Conditions of Contract for Design and Construct (optional – refer main contract where applicable)
  - AS 4130 PE pipe & fittings
  - AS 4129 Fittings for polyethylene (PE) pipes for pressure applications
  - AS 3500.1 Plumbing & Drainage, Water services
  - AS 3000 Wiring rules
  - AS2845 Water supply - Backflow prevention devices
  - AS 2698.2 Plastic pipes & fittings for irrigation & rural applications – Polyethylene rural pipe
  - AS 2698.3 Plastic pipes & fittings for irrigation & rural applications – Mechanical joint fittings for use with polyethylene micro-irrigation pipe
  - AS 2566.2 Buried flexible pipelines, Installation
  - AS 2142 General Conditions of Contract (optional – refer main contract where applicable)
  - AS 2053 PVC wire conduits
  - AS 2033 Installation of PE pipe systems
  - AS 2032 Installation of PVC pipe systems

- AS 1477 PVC pipe & fittings
- AS 1432 Copper tubes for plumbing, gas fitting & drainage applications
- All relevant Australian Standards associated with these works
- Manufacturers specifications, installation & operating instructions
- Local power authority requirements and NSW electrical code
- Local water supply authority requirements and NSW plumbing code
- Tweed Shire Council development guidelines and requirements
- Tweed Shire Council irrigation assets specifications
- Tweed Shire sign manual

#### 16.2 Reference information

- Climate data <http://www.bom.gov.au/>
- Irrigation Australia <http://www.irrigation.org.au/>

### **E. Contractual Matters**

#### 17. Tenders

17.1 Where issued by TSC RSU, tenders shall be weighted in accordance with project needs to take into account, including but not necessarily limited to the following criteria:

- Capability, similar type & size of projects completed
- Personnel, experience & qualifications
- Conformance, design and specification
- Capacity, staff & equipment
- Availability, meet project delivery timeframes
- Submission, including quality, safety & environmental plans
- Value assessment, quantity survey & price
- Risk assessment, including insurance cover
- Locality, proximity to shire or site
- References, recent similar projects

#### 18. Goods & Services Tax (GST)

18.1 For GST inclusion, refer main or principal contract.

18.2 Where not instructed, show all amounts;

- Net pricing exclusive of GST.
- Separate GST amount.
- Total price inclusive of GST.

## 19. Contracts & Commercial Terms

19.1 The contract or commercial terms are not in the scope of this specification.

19.2 Commercial terms are covered separately by the applicable contract or sub-contract with either: Tweed Shire Council, developer, project manager, principal or main contractor. Where a contract has not been nominated either AS2124 or AS4300 shall apply.

## 20. Insurances

20.1 Refer main or principal contract.

## 21. Payment

21.1 Refer main contract for all payment terms and conditions, including:

- Invoice dates
- Payment terms
- Bonds or retentions

## 22. Warranty

22.1 Materials

- minimum 1 year against faulty materials or product defects
- extended product warranty where greater than 1 year in accordance with manufacturers specifications, terms & conditions

22.2 Workmanship, 1 year against faulty workmanship and defects unless stated otherwise in contract

## 23. Indemnity

23.1 The intent of this specification is to provide a minimum standard for TSC irrigation assets and does not relinquish the contractor or supplier from

responsibilities not covered under this specification or normally associated with the scope of works.

- 23.2 The contractor or supplier shall familiarize themselves with the specification and raise any concerns prior to accepting or commencing works.

#### 24. Discrepancies

- 24.1 In the event of a discrepancy, the matter shall be communicated immediately with the TSC Parks Asset Supervisor.
- 24.2 Where there is a contradiction between this specification and project drawings, the specification shall take precedence however confirmation shall be sought if a discrepancy is found.

#### 25. Disputes

- 25.1 In the event of a dispute, the matter shall be communicated immediately with the TSC Parks Asset Supervisor.
- 25.2 If a satisfactory dispute resolution cannot be negotiated, the matter may be referred to the TSC administration for consideration. Minor unresolved matters may be referred to an independent arbitrator via the Institute of Arbitrators & Mediators Australia unless otherwise specified in the contract.

#### 26. Irrigation contractor

- 26.1 The irrigation contractor must have appropriate experience in completing similar type and scale of project.
- 26.2 All irrigation installation work must be supervised on site by an irrigation supervisor &/or foreman holding a Certificate III in Irrigation, issued by Irrigation Australia Limited or approved RTO, along with appropriate experience for the scale of project.
- 26.3 The Contract Manager may request references of similar type and size projects and certificates to pre-qualify irrigation contractor, project supervisor, foreman installation, staff&/or sub-contractors.
- 26.4 The irrigation contractor shall ensure a full set of current irrigation layout drawings, construction details and specifications are available on site, including amendments.
- 26.5 All irrigation installers on site must have appropriate training and supervision for their assigned tasks, along with current OHS Construction (white or blue) card.

## 27. Timing

- 27.1 Refer main contract for specific times and requirements, where applicable.
- 27.2 A detailed construction schedule in the form of a Gantt chart shall be required to be provided by the irrigation contractor and coordinated with the Parks Asset Supervisor or project manager for approval prior to commencement of works on site, including;
- Design
  - Pre-start
  - Installation(milestones & stages for large projects, including hold or inspection points where required by TSC)
  - Practical completion
  - Commissioning
  - Training
  - On maintenance handover
  - Maintenance program
  - Off maintenance handover

## 28. Inspections and hold points

- 28.1 At the prestart meeting the TSC Parks Asset Supervisor or authorized representative shall nominate a requirement for inspection, witness or hold points.
- 28.2 The requirement for inspection or hold points may depend on the scale and nature of the project. As an example, typical milestones during installation are;
- Setout main.
  - Mainline installation – inspect trench, pipe, valves & cables.
  - Mainline flushing & then pressure test.
  - Setout sprinklers.
  - Lateral flushing – till clear of sediment & debris.

**F. Project Management**

## 29. Pre-Start meeting

29.1 Conduct pre-start meeting at least 1 week prior to commencement.  
Attendance to include:

- Main contractor's project manager
- Irrigation contractor's project supervisor or site foreman
- TSC Parks Asset Supervisor or Irrigation Assets Foreman

29.2 Review setout and installation of equipment

29.3 The irrigation contractor shall identify and flag all services along trench routes, prior to commencement of works.

29.4 Instruct all parties on timing, contractor to provide detailed schedule

## 30. Final grade

30.1 It is the main contractor's responsibility to handover the site to irrigation contractor with bulk earthworks & soil final grade for all surface treatments is established or, in the event of any pre-works required pegged with finished levels notated.

## 31. Interruption to Facility Use

31.1 The contractor shall co-ordinate all works with TSC Parks Asset Supervisor or project manager to minimize disruption to facility use and consider priorities in relation to special events, etc. All work in progress shall be suitably backfilled &/or flagged by the contractor, and/or sub contractors, where applicable

## 32. Site parking &amp; access

32.1 Reasonable parking and site access shall be provided, or in accordance with main or principal contract.

## 33. Site Storage

33.1 Materials & equipment may be stored inside a suitable compound at a point to be decided by TSC Parks Supervisor or project manager. Responsibility of compound and facilities shall be in accordance with main or principal contract.

## 34. Site Tidiness

34.1 Site is to be kept tidy at all times by contractor. Project manager or main contractor to provide rubbish bins and removal, unless otherwise specified.

### 35. OHS

35.1 Refer main or principal contract.

35.2 All works to be carried out in compliance of national & state occupational workplace health & safety requirements. Safety manual and Safe Work Method Statements to be provided as required under main contract.

35.3 All workers on site must have a NSW or QLD (White or Blue) construction safety card.

### 36. Site Induction

36.1 Refer main or principal contract.

36.2 All workers on site to be inducted in accordance with main contractor or project managers requirements.

### 37. Environmental protection and management plan

37.1 Refer main or principal contract.

37.2 All works to be carried out in compliance with state Environmental Protection Authority statutory requirements. Environmental management plan to be provided as required under main contract, where applicable.

### 38. Commissioning & Testing

38.1 Backflow, RPZD;

- Test certificate and appropriate documentation to be provided to TSC PAS by the contractor from a licensed plumber for any new backflow devices supplied by irrigation contractor – refer operations and maintenance manual.
- Check strainer is clean.
- Test performance, log pressure across a range of flows at least 2 points from minimum flow up to maximum design duty. Confirm consistent with design operating pressure requirements.

38.2 Control system;



- Test power.
- Run diagnostics.
- Fill in station detail data sheet/s inside enclosure & insert copy with operation and maintenance manual.
- Setup irrigation programs in accordance with current maintenance requirements.
- Run test cycles, confirm operation.

### 38.3 Pipework;

- Flush all pipework, mainline first then laterals, prior to final sprinkler fit out & operation.
- Pressure test mainlines to 1000kPa for 30 minutes within +/- 50kPa. Identify and fix, if any leaks. Repeat test until within tolerance, isolate areas where required.

### 38.4 Control cables.

- Check circuit/coil resistance within specification.

### 38.5 Valves

- Check all manual valves and set manual valves to correct position for normal operation.
- Set flow control on all solenoid valves for smooth open/close operation.
- Set Accu-Set pressure regulating modules on solenoid valves to correct design operation pressures, refer drawings and sprinkler specification and selection charts.
- Check automatic operation of all solenoid valves.
- Check valve box lid &/or SS tag ID's.
- Remove flagging, if no longer required.

### 38.6 Sprinklers & Rotors

- Ensure final height set to correct grade.
- Ensure no blockages or debris in sprinkler or nozzle.
- Check suitable nozzle pressure.
- Adjust arc & diffuser where required to minimize overspray.
- Remove flagging, if no longer required.

### 38.7 Drip zones

- Open flush valves until clear of debris.
- Clean filters.
- Test all drip zones during commissioning at end of line flush valves for acceptable pressure range, minimum 175 kPa to maximum 250kPa, by connecting pressure gauge to flush valve hose.

### 39. As constructed drawings

- 39.1 Refer 'Drawings standards' section.
- 39.2 Maintain accurate updates on drawings throughout construction activity.
- 39.3 Show locations of all spare wires, mark 'SP' on drawings.
- 39.4 Scaled pdf's to be submitted with operation & maintenance manual.
- 39.5 Update autocad files on completion to be submitted to TSC Parks Asset Supervisor, prior to handover.

### 40. Operation & maintenance manual

- 40.1 Two hard copies in binders, with index & sectional dividers with soft copy on USB flash drive (folders to mirror index) inserted in each binder, including;
  - List assessment of sites potential OWHS risks.
  - List assessment of sites potential environmental risks.
  - Contact list – contractor/s, service agents, and key personnel.
  - List main supplier/s for each key component.
  - As constructed drawings, scaled A3 (min sheet size).
  - Include a spreadsheet with all stations details included valves sizes, sprinkler type, spacing, nozzle selection, total flows & precipitation rates.
  - Controller program charts with peak monthly run times for all stations based on historical weather data from nearest Bureau of Meteorology weather station.
  - Water management plan with water budget % for each month, based on historical weather data from nearest Bureau of Meteorology weather station, completed with total irrigated site area and estimated monthly water usage.
  - Technical specification data for all key components.

- Test certificate from a licensed plumber for any new backflow device/s supplied by the irrigation contractor, where applicable.
- Manufacturer’s manual for operation & maintenance of all key components.
- Include system trouble shooting chart/s detailing common faults, diagnostics & remedies.

#### 41. Training

41.1 Allow for training of all relevant project managers or main contractors grounds staff at the start of maintenance period, including:

- Introduction to ‘Operation & maintenance manual’, detailed in section above.
- Detail any specific irrigation requirements including run times and irrigation frequency, current and/or future.
- Water supply; overview of flow capacity and pressure requirements.
- Control system; programming and operation.
- Valves & filters, settings; operation and maintenance.
- Sprinklers; nozzles, settings, operation and maintenance.
- Drip tube zones; operation, flushing and maintenance.
- Basic troubleshooting, include any special tools & available spare parts.

#### 42. Practical Completion

42.1 Refer main contract.

42.2 Where not specified, assume at completion of supply & installation phase with basic system operation functionality. Installation may be completed in stages – this should be reflected in construction program where required.

#### 43. On Maintenance Handover

43.1 Upon completion the contractor shall arrange the On Maintenance Handover site inspection with TSC Parks Asset Supervisor or nominated representative. The contractor shall target zero defects prior to handover inspection. If for logistical reasons portions of the works cannot be completed at completion milestone, partial or staged inspection process may be requested. Allow at least 5 working days notice for all inspections.

- 43.2 Complete TSC Irrigation Handover Checklist and TSC RSU will sign or issue On Maintenance notification providing there are no major defects after satisfactory site inspection. Any outstanding works or defects will be listed on Handover checklist.
- 43.3 Minor defects may be allowable during maintenance period providing they are rectified within 1 week of On Maintenance notification. Completion of defects may be as instructed pending nature and urgency of the defect/s, providing all defects are completed before off maintenance inspection.
- 43.4 The TSC shall inspect defects at any time after On Maintenance Handover and again at Off Maintenance Handover. If required, additional formal TSC irrigation inspections due to defects shall be at the cost of the contractor at \$250 per inspection, at the discretion of TSC Parks Asset Supervisor.
- 43.5 TSC may undertake outstanding defects not rectified within the nominated timeframe. The rectification costs may be passed onto the irrigation contractor if the outstanding defects are deemed to be the responsibility of irrigation contractor.

#### 44. Maintenance Period

- 44.1 Refer principal contract, where applicable.
- 44.2 Where not specified, allow minimum 2 months.

#### 45. Vandalism

- 45.1 Refer principal contract, where applicable.
- 45.2 Where not specified, generally the irrigation contractor's responsibility up until on-maintenance inspection is completed, after which time the responsibility transfers to the main contractor or project manager until the end of maintenance period. At completion of the maintenance period TSC parks assume responsibility for all maintenance requirements due to vandalism.

#### 46. Maintenance Program

- 46.1 Refer principal contract, where applicable.
- 46.2 Where not specified, allow minimum 2 months.
- 46.3 Monthly inspections to include:
- Function test each station & check correct operation.

- Make plant health, weather and soil moisture observations.
- Adjust controller program to suit current seasonal requirement, monthly water budget %.
- Log flow meter readings and calculate actual monthly water use, check budgeted monthly water use.
- Record monthly inspection on TSC Irrigation Maintenance Report form, attach photo's if any unusual incidents or vandalism.
- Note any faults and report issues to project manager, main contractor or TSC Parks Asset Supervisor as applicable.

46.4 NOTE: The irrigation intervals should be extended to normal seasonal requirements within 1 to 2 months from establishment of each stage & with program times adjusted to suit - the main contractors maintenance staff needs to be informed of this during 'Training' section, above.

#### 47. Off Maintenance Handover

- 47.1 At completion of maintenance period the contractor shall arrange the Off Maintenance Handover site inspection with TSC Parks Asset Supervisor or nominated representative. The contractor shall target zero defects prior to handover inspection. Allow at least 5 working days notice for all inspections.
- 47.2 Complete TSC Irrigation Handover Checklist and TSC PAS will sign or issue Off Maintenance notification providing there are no defects after satisfactory site inspection. Any outstanding works or defects will be listed on Handover checklist.
- 47.3 Minor defects may be allowable providing they are rectified within 1 week of Off Maintenance notification, or as instructed pending nature or urgency of the defect/s.
- 47.4 The TSC shall inspect defects at any time within 1 month of Off Maintenance Handover to confirm rectification. If required, additional formal TSC irrigation inspections due to outstanding defects not rectified shall be at the cost of the contractor at \$250 per inspection, at the discretion of TSC Parks Asset Supervisor.
- 47.5 TSC may undertake defects not rectified within the nominated timeframes. The rectification costs may be passed onto the irrigation contractor if the outstanding defects are deemed to be the responsibility of irrigation contractor.

#### 48. Subcontractors

- 48.1 All sub-contractors must have statutory licenses and appropriate experience for assigned tasks or works to be carried out, including; plumbing, electrical and machinery operators.

#### 49. Machinery & Equipment

- 49.1 All machinery and equipment shall be fit for purpose and be operated by appropriately trained &/or licensed personnel as required.
- 49.2 Machinery or equipment requiring registration or safety tags shall have current sticker or inspection tags.

**G. Supply of Goods & Services**

## 50. Water supply

- 50.1 Incoming water supply shall normally be provided by the developer, principal contractor or project manager, unless otherwise specified in the contract.
- 50.2 The irrigation contractor is required to specify duty requirements to meet irrigation design criteria, including dynamic pressure at required peak flow.
- 50.3 The main contractor is responsible to provide confirmation &/or testing or water supply capacity where required. For potable water supply the modeling data can be requested from TSC water supply engineer where required, in particular where infrastructure may not yet be available.
- 50.4 Potable water: Incoming water supply infrastructure c/w isolation valve , TSC meter & stub of adequate capacity within irrigation area precinct at proposed backflow prevention device location by irrigation contractor to be provided by the developer, principal contractor or project manager. Should potable supply capacity be inadequate the option of break tank with pump station option may be considered. Detailed layout and design data is to be provided for any proposed break tank or boosted system.
- 50.5 Alternative water sources: Alternative water sources may be used; such as recycled water, stormwater harvesting, bore or river providing the water is of sufficient capacity, suitable quality and appropriate permits or licenses are met. Detailed layout and design data is to be provided for any proposed alternative water source.

## 51. Water Use

- 51.1 Water use shall normally be provided by the developer, principal contractor or project manager, unless otherwise specified in the contract.
- 51.2 The irrigation contractor is responsible for monitoring water use from commencement through to completion, and throughout maintenance period where applicable.
- 51.3 Costs associated with excessive water use may be attributed to the irrigation contractor if deemed to be negligent in demonstrating reasonable duty of care. Greater than 25% of estimated seasonal water use shall be deemed excessive. Estimated seasonal usage shall be adjusted accordingly in the case of unseasonal weather conditions, such as extreme heat or significantly below average rainfall. The TSC Parks

Asset Supervisor is responsible for reporting any known excessive water usage if detected within 2 working days, or immediately in the case of a major defect, to the irrigation contractor.

51.4 The TSC is responsible for managing water usage once the system has passed off maintenance handover, or connected to the TSC central control system

## 52. Recycled water

52.1 Where alternative non-potable water sources are to be used such as recycled water;

- Lilac identification is required on all: pipes, valve boxes and sprinklers
- Erect signage on site at two or more visible appropriate locations, such as park or field entry points, eg; 'Recycled Irrigation Water – Do not drink'. Refer to the TSC sign manual for standard dimensions and layout.

## 53. Power supply

53.1 Incoming power supply shall normally be provided by the developer, principal contractor or project manager, unless otherwise specified in the contract.

53.2 The irrigation contractor is required to specify power requirements. The main contractor is responsible to provide confirmation &/or testing or power supply capacity where required.

53.3 Incoming power supply to irrigation controllers, pumps and associated equipment where applicable at nominated points within irrigation precinct at nominated locations. Surge protection be included in all power outlets

## 54. Access conduits & penetrations

54.1 Access conduits under roads, paths and hard surfaces shall normally be provided by the developer, principal contractor or project manager, unless otherwise specified in the contract. Minimum under road or path conduit size, 100mm PVC PN9, larger or multiple conduits may be required. Install bronze kerb makers stamped 'IC' where conduits installed under roads with kerbs.

54.2 Penetrations through walls and buildings shall normally be provided by the developer, principal contractor or project manager, unless other



specified in contract. All penetrations to be sealed neatly and lagged where appropriate.

54.3 The irrigation contractor may be required to provide an access conduits plan to the main contractor.

#### 55. Irrigation suppliers

55.1 Irrigation suppliers shall be authorized service agents for products offered with the capacity to deliver reliable technical and warranty support.

## H. Water Supply Tanks, Pumps & Treatment

### 56. Water Tanks

56.1 Generally water tanks are not required unless specified, typically for;

- Where an alternative or additional water source to potable is planned.
- Where the irrigation design duty exceeds the potable water supply capacity and requires a break tank and pump station.

56.2 Tank capacity shall allow for reliable irrigation water supply during peak season based on climatic data and based on balancing inflows and outflows.

56.3 Site specific specification and construction detail shall be required for approval by TSC Parks Asset Supervisor. The following water tank product and installation information is provided as a guide only.

#### 56.4 Products

- Above ground < 45kl, light green poly. Polyworld or equal
- Above ground > 45kl, light green colorbond steel with liner. Rhino or equal
- Above ground & Underground, reinforced concrete. Approved contractor with appropriate qualifications & sound experience.

#### 56.5 Installation

- Refer Appendix for standard construction details.
- Level compacted base with sand or crusher dust capping
- Fittings to include; inlet, float valve, overflow to waste, lockable inspection cover, outlet, discharge valve, drain valve to waste, and.
- Multi-trode level sensor (tank height) with MTIC in wall mount enclosure, connect input to pump control panel & pause pump at low level (400mm above suction outlet). Other inputs may be required for; start, stop, interrupt & alarm signals.
- External visual mechanical float level indicator fitted to tank.
- Where access ladders required the ladders must meet relevant Australian Standards.
- Security enclosure fence with access gates required for tank compound.

- Extended service entry hard surface treatment may be required for tank compound to provide access from nearest available driveway or road.
- Must comply with TSC Health & Building regulations.
- If any RTU or SCADA system network integration requirements – refer TSC Engineering & Operations, water department.

## 57. Pumps

57.1 Generally pumps are not required unless specified, typically for;

- Where an alternative water source to potable is planned.
- Where the irrigation design duty exceeds the potable water supply capacity and requires a break tank and pump station.

57.2 Pump duty must meet peak season irrigation requirements.

57.3 Site specific specification and construction detail shall be required for approval by TSC Parks Asset Supervisor. The following pump product and installation information is provided as a guide.

57.4 Products

- Surface mounted pumps, vertical multistage. Grundfos CRI or ITT Lowara eSV
- Submersible pumps, multistage borehole. Grundfos SP or ITT Lowara GS/Z6
- VFD and Multi-pump applications: Grundfos Solo-E/MPC or Lowara Hydrovar
- Special applications: Grundfos or ITT Lowara
- Pump & motor construction materials selection to suit water quality.

57.5 Installation

- Refer Appendix for standard construction details.
- Packaged pump stations are required unless otherwise stated. Packaged pump stations shall be manufactured by the pump OEM or pump OEM's authorized distributor
- Single pump control panel minimum requirements to include; mains isolation switch, on-off-auto selector, pressure control, low pressure protection with delay timer, low level pause protection, alarm output, starter, switchgear and all sensors. In addition, multi-pump control panels shall have a control unit with display and keypad with user

friendly menus for system status, operator setting adjustments, data and alarm logs. Panel components to be clearly labeled, cables tagged and circuit diagram provided with instruction manual.

- Pump selection shall ensure seamless operation within the design pressure range from minimum to maximum flow range without cycling or hunting.
- Variable speed control shall be required for motors > 4kW, flows > 3 l/s, and where flows are significantly variable > 20%. All VFD motor cables must be shielded and grounded in accordance with manufacturers recommendations.
- Multiple pumps may be required for large flows, variable flows or duty/standby capability.
- Submersible pumps shall be fitted in a vertical orientation and ensure minimum water velocity across motor is achieved during operation. A motor cooling shroud must be fitted to all submersible pumps in well or tank installations.
- Pump station valves and associated equipment shall generally include, but not limited to; foot valve(w/a), isolation valves, pressure gauge, pressure tank with both isolation & vent valve, check valve/s (w/a multi-pump) and flow meter. A flexible connection or single rubber sphere coupling is required on pump discharge manifold take off connection. Valves and equipment material construction shall be graded in accordance with suitability for water quality.
- Pump station pipework shall be stainless steel, graded in accordance with suitability for water quality. Unless stated, generally 304 grade stainless steel for water with low corrosion risk (potable water), and 316 grade stainless steel with moderate to high corrosion risk (recycled). Passivate all pipe welds. Copperwork and polyethylene (PE100) may also be used for connection pipework.
- Support and anchor all suspended pipework, using stainless steel or HDG MS fabricated brackets, with stainless steel or galvanized fixings. Unistrut brackets & Ramset fixings, or equal.
- A stainless steel base plate or HDG MS base frame, with stainless steel or galvanized fixings, is required. Shim to level.
- Slab and secure enclosure or shed shall be required, if not available or provided by others.
- For externally mounted pump control panels, fit in IP66 weatherproof 316 stainless steel or marine grade alloy lockable enclosure with swing

handle hasps to accommodate TSC standard padlocks. B&R or equal. A temporary lock is recommended for security until handover to TSC. The permanent lock shall be provided by TSC and master keyed to TSC requirements, at handover.

- For pump shed where specified, unless otherwise stated use industrial quality colorbond steel shed with; adequate clearances, cross flow ventilation, vermin proof, access door/s (master keyed to TSC parks), general power outlets , internal lighting & external weatherproof sensor light. Comply with local building code &/or permits, taking into account; location, wind rating and soil type – for structural engineering and slab construction elements. Rebuild or equal, builder must be approved by TSC PAS. External finishes colour, Wilderness green.
- Seal pipe penetrations neatly using rubber flange gaskets to all enclosure entry and exit points. Apply lagging where required to protect pipe.
- If any RTU or SCADA system network integration requirements are specified – refer TSC Engineering & Operations, water department.

## 58. Water Treatment

58.1 Water treatment is generally not required unless specified in main contract and does not form part of this specification, other than basic sediment filtration.

58.2 The contractor may be recommend advice where there are concerns over water quality, such as recycled water, and the proposed application. In this case analysis of water, soil and/or plant samples will be referred to a recognized industry consultant for site specific recommendations.

58.3 For site specific water treatment, where recommended or required, refer TSC Parks Asset Supervisor.

## 59. Primary Filter

59.1 Generally mainline or primary filters are not required with potable water supplies connected directly to RPZD assembly which has a strainer unless specified, typically for;

- Where an alternative water source is used.
- Where a break tank and pump station is required.

59.2 Filter capacity must meet or exceed peak flow requirements and factor in water quality for minimal maintenance. Water sampling and analysis

may be required. Routine manual filter cleaning or maintenance requirements shall be kept to the minimum.

59.3 Site specific specification and construction detail will normally be required for approval by TSC Parks Asset Supervisor. The following filter product and installation information is provided as a guide only.

#### 59.4 Products

- Manual filters, screen with brush kit & flush valve. Flows < 3 l/s & relatively low sediment load clean water. Amiad super c/w scanaway kit.
- Automatic filters, electric interval timer & hydraulic differential. Flows > 3 l/s &/or relatively high sediment load clean water. Filtomat or Amiad automatic.

#### 59.5 Installation

- Refer Appendix for standard construction details.
- Fitting to include; upstream isolation valve, upstream pressure gauge, vent valve, flush valve, flush pipe to waste, downstream isolation valve, downstream pressure gauge. Where suitable waste drain is unavailable, route flush outlet to nearest swale drain a concrete headwall with apron, extend flush pipe through headwall and install with frog flap to outlet.

**I. Irrigation Control Systems, Sensors & Components**

## 60. Central Control System

60.1 The TSC has an existing PC based central irrigation control system using Hunter IMMS software c/w ET module.

60.2 Product: Dell Precision workstation or equal

60.3 Computer hardware & accessory, min requirements (\*)

- 1TB Hard drive
- 3 Ghz Processor
- 16 GB RAM
- 1 GB graphics card
- Modem
- Plain phone line port
- 4x USP ports
- DVD-RW
- Media Card readers
- Sound card & speaker/s
- 3 year on-site warranty
- 22" Full HD monitor
- Wireless keyboard & mouse
- Multi function printer, A4 color copy, scan & fax
- External modem, dial up
- 1 TB External backup hard drive
- Uninterrupted Power Supply (UPS) c/w surge protection filter and min 4 hours backup power supply to computer

60.4 Computer software requirements(\*);

- Operating System, Windows 8 or most recent
- Irrigation central control, Hunter IMMS c/w ET module
- Administration, Microsoft Office Professional
- PDF reader, Adobe
- Remote management, pcAnywhere

- Anti virus protection, Norton
- 60.5 (\*) Hardware & software requirements are subject to confirmation at time of upgrades. Equipment & software version #.#'s should be the most recent unless otherwise specified or compatibility issues. Software & equipment must be compatible.
- 60.6 All new field controllers and system upgrades shall be Hunter ACC and must be compatible with Hunter IMMS software, c/w GSM communications module
- 60.7 TSC shall provide a Telstra GSM SIM card for all field controllers, with data number enabled and PIN disabled. Telstra code #26/20
- 60.8 Installation
- Refer Appendix for standard construction details & IWMP program guide.
  - Connect all computer hardware including backup drive, external modem, UPS & printer c/w cables
  - Load all software and configure all equipment
  - Load database for all field controllers & setup initial programs
  - Confirm remote communications
  - Create backup database & backup schedule

## 61. Irrigation field controllers

- 61.1 Remote site irrigation field controllers are to provide accurate programming to meet plant requirements, operate automatic control valves on site and accept environmental sensor inputs.
- 61.2 Product: Hunter ACC field controllers
- Standard ACC Modular, up to 42 stations for wire runs up to 250m
  - ACC Decoder, up to 99 stations may be used for wire runs > 250m or shall normally be required for cable runs > 400m, subject to irrigation designer's recommendation and TSC Parks Asset Supervisor approval.
  - Hunter ACC-COM-GSM-E communications module fitted.
  - Input; 1A @ 230V single phase.
  - Max output; 4A @ 24VAC.
- 61.3 Installation
- Refer Appendix for standard construction details.



- Wall mount - Hunter plastic wall mount enclosure fitted in 600x600x300mm security enclosure, IP66 weatherproof, 316 stainless steel, B&R or equal. The enclosure shall be fitted with swing handle hasps to accommodate TSC standard padlocks. A temporary lock is recommended for security until handover to TSC. The permanent lock shall be provided by TSC and master keyed to TSC requirements, at handover.
- Outdoor free standing enclosures - Where a TSC building or wall is not available in close proximity to a suitable controller location, mount in Hunter ACC plastic pedestal c/w concrete plinth.
- Grounding in accordance with manufacturers recommendations. Provide separate 20mm conduit with 6mm earth wire to separate ground rod & or earth plate. Connect with bare copper wire connected with Cadweld or approved earth clamps, locate copper ground rods or plates in 250mm round valve box. Grounding to be tested and ohms recorded in handover checklist. Ground resistance shall be <10 ohms or in accordance with OEM requirements.
- Support exposed conduits with corrosion resistant brackets and fixings. Protective galvanized MS duct cover to all exposed PVC conduits.
- Vermin proof all conduits with expanding caulk. Spray base with long acting ant repellent surface spray, taking care not to directly spray any electronic components.
- Incoming power supply at enclosure location with surge protection and isolation switch – by others, unless otherwise specified.

## 62. Environmental Sensors

62.1 To monitor to local weather conditions and interface with IMMS central control, via ACC field controllers

62.2 Environmental weather sensors to be fitted to all sites, unless otherwise specified by the PAS or the contract:

- Sites > 2500m<sup>2</sup> irrigated area: Hunter ET system c/w Anemometer
- Sites < 2500m<sup>2</sup> irrigated area: Hunter Rain-Clik or Wireless Rain-Clik

62.3 Installation:

- Connected to the field controllers, refer Appendix for standard construction details.
- Mount in exposed location on roof/gutter bracket or galvanized post with stainless steel brackets & concrete post footing.

- Site location and height shall take into consideration to minimize potential vandalism.

### 63. Power cables (HV)

- 63.1 High voltage power supply to irrigation controllers, pumps or other powered devices normally provided by main contractor or project manager, unless otherwise specified.
- 63.2 240V & 415V is accordance with AS3000 and local electrical authority code.
- 63.3 Installation:
- All high voltage work to be carried out by licensed electrician.
  - All VFD motor cables must be shielded and grounded in accordance with manufacturers recommendations.
  - Maintain minimum 200mm separation between HV and control or communications cables when run in parallel in common trench.

### 64. Control cables (standard ULV)

- 64.1 Cables to supply 24V power to automatic control valves and sensors for standard ACC irrigation controllers.
- 64.2 Product:
- Tycab Tyflo
  - Multistrand plain oxygen free copper wire
  - UV stabilised polypropylene insulation
  - Common, minimum 2.5 mm<sup>2</sup> (7/050), single core.
  - Actives, minimum 1.5 mm<sup>2</sup> (7/050), multicore (3, 5, 7, 9 & 13 core)
  - Connections, waterproof suit direct burial. 3M DBY or DBR
- 64.3 Installation:
- Refer Tables for maximum cable runs lengths and Appendix for standard construction details.
  - Where above ground ULV control cables shall be installed in MD Electrical conduit and supported with galvanized conduit brackets anchored with corrosion resistant fasteners.
  - Where not in a common trench with irrigation main pipe, ULV control cables shall be installed in MD UG Electrical conduit.

- Any path or road crossings must be in access conduit, normally provided by others unless specifically noted
- Avoid in field cable joints to extend ULV cables. All in field cable joints must be located in 910 valve box & shown on AC plans. Valve box lid ID = 'CJ'.
- Snake cable in trenches & tape to one side of mainline at 6m intervals.
- Allow expansion loops at all bends junctions.
- Allow 1m spare cable loop at each solenoid valve.
- Allow minimum 1 spare active core at the end of each route.

#### 65. Control cables (decoder ULV)

65.1 Cable to supply 34V power and communication to decoders for ACC Decoder irrigation controllers, where applicable.

##### 65.2 Product:

- Decoder cable, up to 2km. Minimum 2 core x 2.1 mm<sup>2</sup> (14AWG) twisted pair c/w outer jacket. Hunter ID1BLU jacketed twin twist.
- Decoder cable, up to 3.5km. 2 core x 3.3 mm<sup>2</sup> (12AWG) twisted pair c/w outer jacket. Hunter ID2BLU jacketed twin twist.
- Connections, waterproof suit direct burial. 3M DBY.

##### 65.3 Installation:

- Strictly in accordance manufacturer's design & installation requirements, including surge protection and grounding.
- Refer Appendix for standard construction details where applicable.
- Up to six cable individual cable paths, do not link or loop any cable paths.
- Where above ground ULV control cables shall be installed in MD Electrical conduit and supported with galvanized conduit brackets anchored with corrosion resistant fasteners.
- Where not in a common trench with irrigation main pipe, ULV control cables shall be installed in MD UG Electrical conduit.
- Any path or road crossings must be in access conduit, normally provided by others unless specifically noted

- Avoid in field cable joints to extend ULV cables. All in field cable joints must be located in 910 valve box & shown on AC plans. Valve box lid ID = 'CJ'.
- Snake cable in trenches & tape to one side of mainline at 6m intervals.
- Allow expansion loops at all bends junctions.
- Allow minimum of 1m spare cable loop at each solenoid valve.
- Test resistance on all cable routes. Maximum ground resistance 10 ohms.
- Refer 'Irrigation controllers, field' & 'Decoders' section for additional information.

#### 66. Special signal or communications cables

- 66.1 Special cables for sensors or modems where applicable, shall be in accordance with manufacturer's recommendations and may require shielding and grounding.

#### 67. Flow meter

- 67.1 To monitor flow including overflow detection to raise alarms &/or shutdown

67.2 Product:

- Hunter HFS flow sensor, FLOW-CLIK-IMMS

67.3 Installation:

- Refer Appendix for standard construction details.
- Locate in Carson 1419-12 standard rectangular valve box
- Mount directly downstream of RPZD, or pump, prior to any mainline take-off points.
- Ensure laminar flow of straight pipe, minimum 10 diameters upstream and 5 diameters downstream, clear of bends or junctions.
- Connect to the field controller with approved communications cable and direct burial cable connectors.

#### 68. Master valve

- 68.1 The master solenoid valve shall limit system leakage and unauthorized use outside of controller programmed irrigation window.

68.2 A master solenoid valve is required for all potable water supplied automatic irrigation systems, except pumped systems.

68.3 Product:

- Linesize up to 80mm mains, BSP; Hunter ICV solenoid valve for Sizes: 25, 40, 50 & 80mm. Glass filled nylon, PN15 rated
- Linesize  $\geq$  100mm, flanged; Amiad/Dorot D47, epoxy coated cast iron globe with bronze controls. PN16 rated
- 24VAC 50Hz coils. Inrush current 0.37 A, Holding current 0.19A
- Manual bleed

68.4 Installation:

- Refer Appendix for maximum valve flows, cable sizes and standard construction details.
- Use cable connectors, suitable for direct burial

68.5 Locate in Carson 1419-12 rectangular valve box, minimum. Valve ID tag = 'MV' & Stencil VB lid same with white weatherproof paint (nom. 50mm font).

## 69. Automatic Control Valves

69.1 Solenoid valves for automatic operation of all irrigation zones, from ACC irrigation field controller.

69.2 Product:

- Hunter ICV solenoid valves c/w AccuSet pressure regulator
- Sizes: 25, 40, 50 & 80mm BSP
- 24VAC 50Hz coils. Inrush current 0.37 A, Holding current 0.19A
- Glass filled nylon, PN15 rated
- Internal manual bleed and adjustable flow control

69.3 Installation:

- Refer Appendix for maximum valve flows, cable sizes and standard construction details.
- Pressure regulation module fitted & set to required irrigation pressure. Pressure regulation modules may not be required where inlet pressure is within 100kPa of design pressure, the system is supplied by VFD pump station & the high-low topography range on site is within 5m

- Fit isolation ball valve
- Use cable connectors, suitable for direct burial
- Locate in Carson 1419-12 rectangular valve box, minimum. Valve ID tag = 'SV #-###' (code, controller # - station ##) & Stencil VB lid same.

## 70. Decoders

70.1 Decoders are to operate automatic ICV solenoid valves and receive sensor inputs.

70.2 Only required in conjunction with ACC Decoder control system, where both recommended by irrigation designer and approved by TSC Parks Asset Supervisor.

70.3 Product:

- Decoders c/w surge suppression, Hunter single address ICD-100 up to six address ICD-600.
- Decoder power draw, 5mA off & 40mA per active output address.
- Sensor decoder, Hunter ICD-SEN.

70.4 Installation:

- Strictly in accordance manufacturer's design & installation requirements, including surge protection and grounding.
- Use no more than 1 solenoid per address.
- Run a 1.5mm<sup>2</sup> ULV control cable common & active for each address to each solenoid valve, do not run common in series loop for multiple address decoders.
- Locate decoder within 30m of solenoid valve, maximum ULV control cable route.
- Sensor decoders will only accept the unpowered digital output function of sensor device, not provide power supply. Sensors device power supply must be from a power supply nearest to the sensor device for 24V supply to sensor devices.
- Where pump start or master valve is required, use single address decoder (with pump start relay for pump stop/start control where applicable). Not required for pressure on demand systems, which are generally preferred.

- Ground surge suppressors with bare copper wire & copper ground rod/s or ground plate/s at least every 10<sup>th</sup> decoder, and no greater than 200m along all cable routes.
- Ground surge suppressors with bare copper wire & copper ground rod/s or ground plate/s at end of all decoder cable routes, and again within 75m back from end of all decoder cable routes.
- Locate all grounding hardware within irrigated area under sprinklers where practical. All grounding copper wire connections using Cadweld or approved connections.
- Use approved cable connectors, suitable for direct burial. 3m DBY.
- Locate in Carson 1419-12 rectangular valve box, minimum, with automatic valve/s.
- Refer 'Control cables, decoder (ULV)' & 'Irrigation controllers, field' for further information.

## **J. Distribution System & Manual Valves**

### 71. Backflow Prevention Devices

71.1 Backflow prevention devices are required for any potable water supply cross connections to all irrigation supply mains in accordance with Australian Standards and local plumbing code.

#### 71.2 Product:

- RPZD, Tyco RP03 C CO assembly including isolation valves & strainer, unless otherwise required or instructed
- Up to 50mm BSP with ball valves
- Greater than 50mm Flanged with butterfly valves
- Size according to system peak duty, target maximum losses across the backflow assembly not to exceed 90kPa

#### 71.3 Installation:

- Refer Appendix for standard construction details.
- Installation to be carried out by qualified persons and tested by a licensed plumber in accordance with NSW plumbing act. A test certificate shall be required in operation and maintenance manual.
- Riser and exposed pipework, Copper or DICL

- HD Fabricated checker plate alloy lockable enclosure with reinforced hinges c/w concrete footings of suitable size with reo-mesh, min 125mm depth & 20mPa. Locks mastered keyed to TSC requirements and supplied by TSC at completion of maintenance period.

## 72. Underground Pipework

### 72.1 Pipework for all underground irrigation mainline and laterals:

- Exception: drip header/flush manifolds or emitter tube laterals (LDPE).

### 72.2 Product:

- HDPE (PE100) PN12.5 in accordance with AS 4130.
- For recycled water applications, use lilac stripe or marker tape.
- PE pipe fittings shall be minimum PN12.5 to AS 4130. Philmac or George Fischer.
- Flanges, Table E or PN16 with rubber gasket where required. PE flanges to include backing ring. Nuts, bolts & washers to be HD Galv or Stainless steel.
- Threaded fittings, BSP.

### 72.3 Installation:

- Refer Appendix for max velocities and standard construction details.
- Installation, per approved manufacturer installation manual in accordance with Australian & industry standards.
- Large bore (>90mm); Butt weld or electro-fusion with flanged connections, to mainline take off points or valves > 80mm.
- Small bore (90mm or less); compression fittings with threaded or flanged connections to valves or key components.
- Tapping saddles where used must have stainless steel nut/bolts. Holes must full size available for tapping diameter and be deburred of swarf. Philmac (Metric PE/SS).
- Teflon tape (or paste) to all threaded joints (where allowable in accordance with manufacturers recommendation).
- Cap or bag & tape all exposed pipework at end of each day to limit potential contamination such as; in event of rainfall, or wildlife.

## 73. Above Ground Pipework



73.1 For above ground pipework, pending size and application, there may be a specific requirement.

73.2 Products,

- Copper, in accordance with plumbing code, normally required for mounting backflow devices  $\leq$  DN80.
- Ductile Iron, fusion coated, normally required for mounting backflow devices  $>$  DN80.
- HDPE (PE100), PN12.5, generally preferred for pump suction and discharge connections.
- Stainless steel 304 or 316, schedule 10, normally required for pump manifolds.
- Hot dipped galvanized, schedule 40. Maybe used on flanged above ground pipework  $\geq$  DN80 at PAS discretion.
- Flanges, Table E or PN16 with rubber gasket where required. PE flanges to include backing ring. Nuts, bolts & washers to be HD Galv or Stainless steel.
- Threaded fittings, BSP. PE, SS or brass.

73.3 Installation:

- Installation, per approved manufacturer installation manual in accordance with Australian & industry standards.
- Support with hot dipped galvanized support posts and brackets. Size and spacing appropriate to minimize vibration and withstand water hammer. Fix with industrial quality corrosion resistant fasteners.
- Thrust blocks in accordance with pipe size and manufacturers guidelines. Lag all pipework and preclude any cables though concrete.
- Teflon tape (or paste) to all threaded joints (where allowable in accordance with manufacturers recommendation).

74. Dissimilar Metals

74.1 Do not use dissimilar metals that create galvanic corrosion issues with pipework, valves pumps, supports, fixings. Fully insulate with appropriate finishes or plating where compatibility issues are unavoidable.

75. Trench Works

- 75.1 Excavate trench depth to maintain min cover of 450mm for mainlines & 300mm<sup>^</sup> for laterals unless exceptional circumstances or existing services limit excavation depth. Note(^) minimum cover for laterals in large area turf & sports turf rotors is 400mm.
- 75.2 Excavate trench width to allow 50mm minimum clearance between pipe OD and trench wall.
- 75.3 Provide level trench base and backfill with clean site fill where suitable. If site fill is found to be unsuitable for back filling, such as rumble or sharp edges, advise main contractor or project manager for a site instruction to sand bed based on day rates. Sand bedding is a variance where required.
- 75.4 Fill & compact trench with appropriate allowance for subsidence.
- 75.5 Backfill all excavation works in same day, where practical. Barricade exposed trenches or excavation with Hi-Viz tape or netting that is not backfilled, prior to departing site for the day.
- 75.6 Flag all new work such as valve pits and sprinklers, through establishment.
- 75.7 Optional unless otherwise specified in main contract, cutting and/or relaying turf and other surface treatments, based on day rates where requested.

## 76. Sandbed

- 76.1 Pipe work shall require sand bedding where site trench material contains sharp edges or is deemed unsuitable.
  - Where sand bedding is required the contractor shall request an order from main contractor or project manager to perform the sand bedding works on agreed day rates or rate per linear metre.
- 76.2 Product:
  - Coarse bedding sand, graded.
- 76.3 Installation:
  - Level trench base, minimum 100mm sand base.
  - Cover and surround from edge of all pipe work, minimum 100mm sand fill.

## 77. Valve Boxes

77.1 All valves and underground devices requiring to be easily located or serviced shall be located in a valve box, sized to allow valve operation and reasonable maintenance clearances.

77.2 Product

- Round: air valves, QCV, isolation valves. Carson 910 c/w SS Loc-Kit
- Rectangular: master valve, solenoid valves, flow meters, any valves that do not provide reasonable service clearance in a 910 round valve box. Carson 1419-12 c/w SS Loc-Kit.
- Special: large valves, filters or underground devices that require service access. Carson Jumbo or valve box extensions may be used.
- For recycled water applications, use lilac lid.

77.3 Installation

- Refer Appendix for standard construction details.
- Compact and backfill under valve pit with free draining coarse sand.
- Support valve box with paver on compacted base to limit subsidence. Ensure pipe and cable is not hard up against sharp edge of pavers or valve box.
- Skirt valve box with Geo fabric bidim fixed with duct tape and seal pipe entry/exit points to limit soil ingress into pit.
- All valve boxes lids will be stamped with valve ID. Stencil VB lid with white weatherproof paint (nom. 50mm font)
- All automatic control valves shall be tagged with stamped SS dog tag cable tied to valve (nom 25x75mm with 10mm font).

78. Mainline Isolation Valves

78.1 Mainline isolation valves are to be strategically located at main junctions and generally along mainline at regular intervals no greater than 200m to facilitate system servicing without complete system shutdown where practical, or excessive drain times.

78.2 Product:

- Linesize, up to 80mm; bronze tested gate valve to AS1628 BSP, AIP or Kitz
- Linesize, >80mm; ductile Iron sluice valve, resilient seat, fusion epoxy bonded, PN16 Flanged, suit underground application to AS2638.2. Tyco or Iplex AVK.

- Include valve handle, with extension, where applicable

#### 78.3 Installation:

- Refer Appendix for standard construction details.
- Use DN200-250 PVC access sleeve to top of valve
- Lag valve/pipe, thrust block, anchor with support straps for valves >80mm where recommended and support above ground valves
- Minimum size 910 round valve box, Carson
- Valve ID = 'IV'. Stencil VB lid with white weatherproof paint (nom. 50mm font)

### 79. Secondary Isolation Valves

79.1 Fit isolation ball valve to allow service of all automatic and air valves without requiring mainline shutdown

#### 79.2 Product:

- Ball valve, bronze with stainless steel handle, DN15 to DN80. AIP DRZ watermarked to AS.

#### 79.3 Installation

- Refer Appendix for standard construction details.
- Connect directly onto associated valve with PE nipple using Pink plumbers tape or Teflon paste.
- Locate in associated valve box to allow valve handle operation.

### 80. Quick Coupling Valves (QVC)

80.1 QVC's are to be installed where required to facilitate manual watering of surrounds and flushing system.

80.2 Locate a QVC at end of all mainline routes as a scour valve.

80.3 Locate a QCV directly next to all turf drip irrigation automatic control valves, where used.

80.4 Where manual watering of surrounds or temporary irrigation is required, locate at maximum 50m intervals along main or 50m grid where area width exceeds 50m.

#### 80.5 Product:

- 25mm bronze one piece QVC lockable c/w anti-rotation collar. Hunter HQ with yellow rubber top, HQ-5LRC-BSP.

- For recycled water applications, use lilac top.

#### 80.6 Installation:

- Refer Appendix for standard construction detail.
- Install on 25x300mm(min) double O-ring swing joint riser, Spears or equal.
- Locate in Carson 910-10 round valve box.
- Valve ID = 'QC'. Stencil VB lid with white weatherproof paint (nom. 50mm font).
- Supply 1x QCV valve key with swivel elbow & 30m white washdown hose c/w 25mm adjustable spray nozzle. Fix with stainless steel hose clamps.

### 81. Automatic Air Valves

81.1 Air valve are to expel air from mainline to reduce potential water hammer on mainline filling, and allow air intake during mainline voiding to prevent vacuum.

81.2 Locate air valves strategically at high points, nominal max 200m intervals pending on size of main, size of air valves and topography.

81.3 Locate air valves end of all mainline routes.

#### 81.4 Product:

- For mainlines 63mm or less, use 25mm ARI D-040 auto air valve
- For mainlines greater than 63mm, use 40 or 50mm ARI D-040 auto air valves

#### 81.5 Installation:

- Refer Appendix for standard construction detail.
- Install on minimum length 300mm double O-ring swing joint riser, same nominal bore as air valve.
- Include isolation valve, AIP DRZ ball valve at base of all air valves, same nominal bore as air valve.
- Locate in Carson minimum 910-10 round valve box.
- Valve ID = 'AV'. Stencil VB lid with white weatherproof paint (nom. 50mm font).

**K. Sprinklers & Rotors Irrigation Emitters****82. Pop-up Sprinklers for Garden Beds**

- 82.1 Pop-up sprinkler irrigation of all garden beds and planted areas, unless otherwise instructed by TSC PAS.
- 82.2 All pop-up sprinklers shall have 300mm high pop up riser, where located along edges and all exposed areas.
- 82.3 Extension poly risers and shrub adaptors may only be allowed in centre of garden beds, or along back of gardens where located along fence or wall providing risk of vandalism is minimal. Where poly risers are used in centre areas, the riser shall extend 300 to 400mm above finished grade mulch level.
- 82.4 All valves or station zones shall have sprinklers with matched precipitation rates.
- 82.5 Products:
- Up to 2.1m spacing, spray head. Hunter 300mm Pro-Spray with #8 MPR nozzle. Nominal set pressure 200kPa.
  - 2m to 3.3m spacing, spray head. Hunter 300mm Pro-Spray with #12 MPR nozzle. Nominal set pressure 200kPa.
  - 3m to 4.2 m spacing, spray head. Hunter 300mm Pro-Spray with #15 MPR nozzle. Nominal set pressure 200kPa.
  - Up to 4m spacing, rotary sprinkler. Hunter 300mm Pro-Spray with MP Rotator 1000. Nominal set pressure 300kPa.
  - 4m to 5.5m spacing, rotary sprinkler. Hunter 300mm Pro-Spray with MP Rotator 2000. Nominal set pressure 300kPa.
  - For recycled water applications, use lilac top.
- 82.6 Installation:
- Refer Appendix for tables and standard construction details.
  - Fit to tapping saddles, must have stainless steel nut/bolts
  - Install on minimum length 300mm articulated riser same nominal bore as sprinkler inlet c/w 3x MF elbows.
  - Set to correct grade, level and at finished height of mulch.
  - Use appropriate nozzle arc & adjust radius to minimize undesirable overspray onto hard surfaces.

### 83. Pop-up Sprinklers for Turf

83.1 Pop-up sprinkler irrigation of all turf areas, unless otherwise instructed by TSC PAS.

83.2 All pop-up sprinklers shall have between 100mm to 150mm pop-up riser, except where I-60 (80mm pop up) is required for low pressure applications.

83.3 All medium to large areas pop-up sprinklers shall have stainless steel risers with built in check valve.

83.4 All valves or station zones shall have sprinklers with matched precipitation rates, or nozzles to suit.

#### 83.5 Products:

- Up to 2.1m spacing, spray head. Hunter 100mm Pro-Spray with #8 MPR nozzle. Nominal set pressure 200kPa.
- 2m to 3.3m spacing, spray head. Hunter 100mm Pro-Spray with #12 MPR nozzle. Nominal set pressure 200kPa.
- 3m to 4.2 m spacing, spray head. Hunter 100mm Pro-Spray with #15 MPR nozzle. Nominal set pressure 200kPa.
- Up to 4m spacing, rotary sprinkler. Hunter 100mm Pro-Spray with MP Rotator 1000. Nominal set pressure 300kPa.
- 4m to 5.5m spacing, rotary sprinkler. Hunter 100mm Pro-Spray with MP Rotator 2000. Nominal set pressure 300kPa.
- 5.5m to 8m spacing, rotary sprinkler. Hunter 100mm Pro-Spray with MP Rotator 3000. Nominal set pressure 300kPa.
- 8 to 11m spacing, rotary sprinkler, Hunter 100mm I-20-04-SS. Nominal set pressure 300 to 350kPa.
- 11 to 16m spacing, rotary sprinkler. Hunter 100mm I-25-04-SS. Nominal set pressure 350 to 400kPa.
- 14 to 18m spacing Rotary sprinkler, Hunter 150mm I-35-06-SS. Nominal set pressure 400 to 450kPa. Use I-35 in all large sports turf applications, unless otherwise specified or directed by TSC Parks Asset Supervisor.
- Rotary sprinkler, Hunter 80mm I-60-ADS or I-60-36S, 11 to 18m spacing. Nominal set pressure 350 to 400kPa. For special applications only in larger parks with limited operating pressure and no boosted supply available.
- For recycled water applications, use lilac cap or rubber cover.

**83.6 Installation:**

- Refer Appendix for tables and standard construction details.
- Fit to tapping saddles, must have stainless steel nut/bolts
- Install on minimum length 300mm articulated riser same nominal bore as sprinkler inlet c/w 3x MF elbows.
- Set to correct grade, level and at finished height of topsoil and turf interface.
- Use appropriate nozzle arc & adjust radius to minimize undesirable overspray onto hard surfaces.



**L. Micro Irrigation & Drip Emitters****84. Drip Tube and Emitters**

- 84.1 Pop up sprinklers are preferred in most applications, however drip irrigation may be used upon recommendation of the irrigation designer and approval of the TSC Parks Asset Supervisor for select landscaped areas to negate any potential overspray, such as traffic islands and roundabouts.
- 84.2 Drip irrigation shall not be used at all in turf areas unless instructed by TSC PAS. Where drip irrigation is used in turf areas, QCV's must be installed at each control valve and link zone to facilitate turf establishment.
- 84.3 All drip tube shall have built in pressure compensated emitters with built in check valve to limit potential for siphon and low head drainage.
- All drip zones shall include; Pressure regulator, filter, header manifold, flush manifold, and drip indicator – all of which are detailed in following sections.
  - Where multiple isolated zones are 'linked' to control valve, a set of air/flush valves and indicators are required at the furthest zone on each link zone route.
- 84.4 Product:
- 13mm PN3.5 drip tube, 2.35 lph @ 0.4m spacing. Hunter PLD-235-040. Nominal design operating pressure 250kPa.
  - For recycled water applications, use lilac drip tube.
- 84.5 Installation:
- Refer Appendix for tables and standard construction details.
  - Offset drip tube 0.2m from all edges or drip zone boundaries. Drip lateral spacing 0.4m.
  - Drip tube lateral maximum run length 70m.
  - At start and end of all drip tube laterals, fit to header and flushing manifold with take-off adaptor and crimp with Cobra stainless steel clamps. At the extremities of irregular shaped zones up to 3 laterals may be teed together prior to manifold, providing maximum lateral flow capacity is not exceeded on any lateral.
  - Install drip tube in garden beds at soil mulch interface, staked with 200mm galvanized J-pegs at 1.5m intervals.

- Install drip tube in turf areas at 100mm (+/- 25mm) below finished top soil grade.
- Test all drip zones are within operating pressure range at end of line flush valves, as per 'Commissioning' section.

## 85. Secondary Filters for Drip

85.1 Filters are to protect all drip tube downstream of automatic control valve.

### 85.2 Product

- Disc filter, 125 micron (120 mesh). Amiad Y super or equal.
- 25mm, 40mm or 50mm sized in accordance with control valve, or greater.

### 85.3 Installation:

- Refer Appendix for standard construction details.
- Locate immediately downstream of drip stations automatic control valve (with pressure regulation fitted) in separate Carson 1419-12, valve box to allow reasonable access for service and cleaning.
- Filter shall have or be fitted with flush-vent valve and downstream pressure test port available for 1/4" BSP pressure gauge to facilitate servicing.
- For non-potable water sources, additional 25mm BSP port with Philmac ball valve shall be required upstream of filter for routine seasonal chemical injection.

## 86. HDPE Zone Link Pipes for Drip

86.1 Link pipes are required where multiple isolated drip zones are connected to an automatic control valve, and under all hard surfaces such as paths or road crossings.

### 86.2 Product

- HDPE (PE100) PN12.5 in accordance with AS 4130.

### 86.3 Installation

- As per 'Pipework, underground' and 'Trench works' sections.

## 87. LPDE Manifolds for Drip

87.1 Drip manifold LDPE pipework is to provide:

- Header pipe at the start axis of all drip tube laterals in a drip area to maintain sufficient hydraulic capacity with an air valve fitted at high point along manifold.
- Flush pipe at the end axis of all drip tube laterals in each drip area with a flush valve at furthest end of each route.

#### 87.2 Product:

- 25mm LDPE, PN3. Iplex or equal.

#### 87.3 Installation:

- Refer Appendix for standard construction details.
- Install at 150mm depth.
- Use LDPE fittings with Cobra stainless steel clamps for all push on fittings.
- As per 'Trench works' section, where applicable.

### 88. Air Valves for Drip

88.1 Automatic air valves in all drip zones to both release air to reduce water hammer and introduce air under to prevent vacuum effect.

#### 88.2 Product

- 20mm automatic air release and vacuum valve. ARI D-040 Barak

#### 88.3 Installation

- Refer Appendix for standard construction details.
- Locate at high point of LDPE manifolds within drip zones in Carson 910-10 round valve box. No isolation valve required for drip air valves, downstream of automatic control valve.

### 89. Flush Valves for Drip

89.1 Flush valves in all drip zones at one end of all flush manifold to facilitate flushing on startup and during service or routine maintenance.

#### 89.2 Product

- 25mm PE ball valve. Philmac

#### 89.3 Installation

- Refer Appendix for standard construction details.

- Locate at furthest end/s LDPE manifolds within drip zones in Carson 910-10 round valve box.
- Connect 1m of white wash-down hose to end of all flush valves, fixed with stainless steel clamp, coiled in valve box.

## 90. Visual Indicators for Drip

90.1 Install one pop up sprinkler per control valve with red sealed nozzle as drip indicator to visually confirm drip zone is operating.

90.2 Product:

- Pop up spray head. Hunter 150mm Pro-Spray with #10 (red) ES nozzle.

90.3 Installation

- Refer Appendix for standard construction details.
- Locate within drip zone/s near garden edge in a visible locate.
- Install on minimum length 200mm articulated riser c/w 3x MF elbows.
- Set to correct grade, level and at finished height of mulch.
- Seal nozzle with silicone to prevent wet spot.

**M. Spare Parts & Tools**

## 91. Spare Parts

91.1 Refer main contract

91.2 Not required unless otherwise specified in main contract

## 92. Special Tools &amp; Accessories

92.1 2x sets of controller &amp; enclosure master keys.

92.2 Any special service tools required for routine service of irrigation and associated equipment.

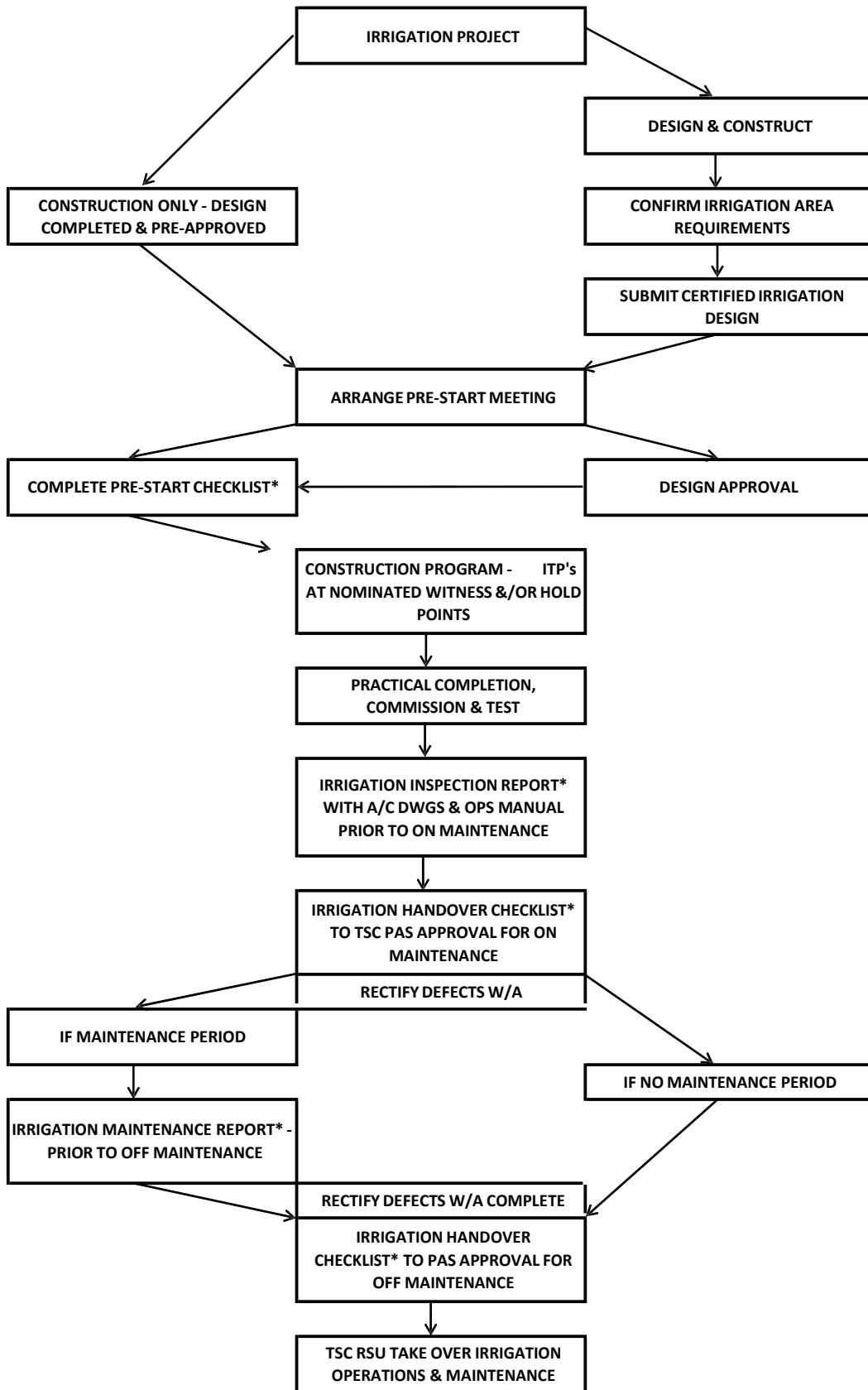
**N. Appendices**

### 93. Appendix A: Charts

93.1 Process flow chart

93.2 Programming controller flow chart

**Flow Chart - Irrigation Project Process**



Note: (\*) refer Appendix C for standard forms & checklists

**Chart 1**



## Flow Chart - Irrigation Controller Programming Instructions

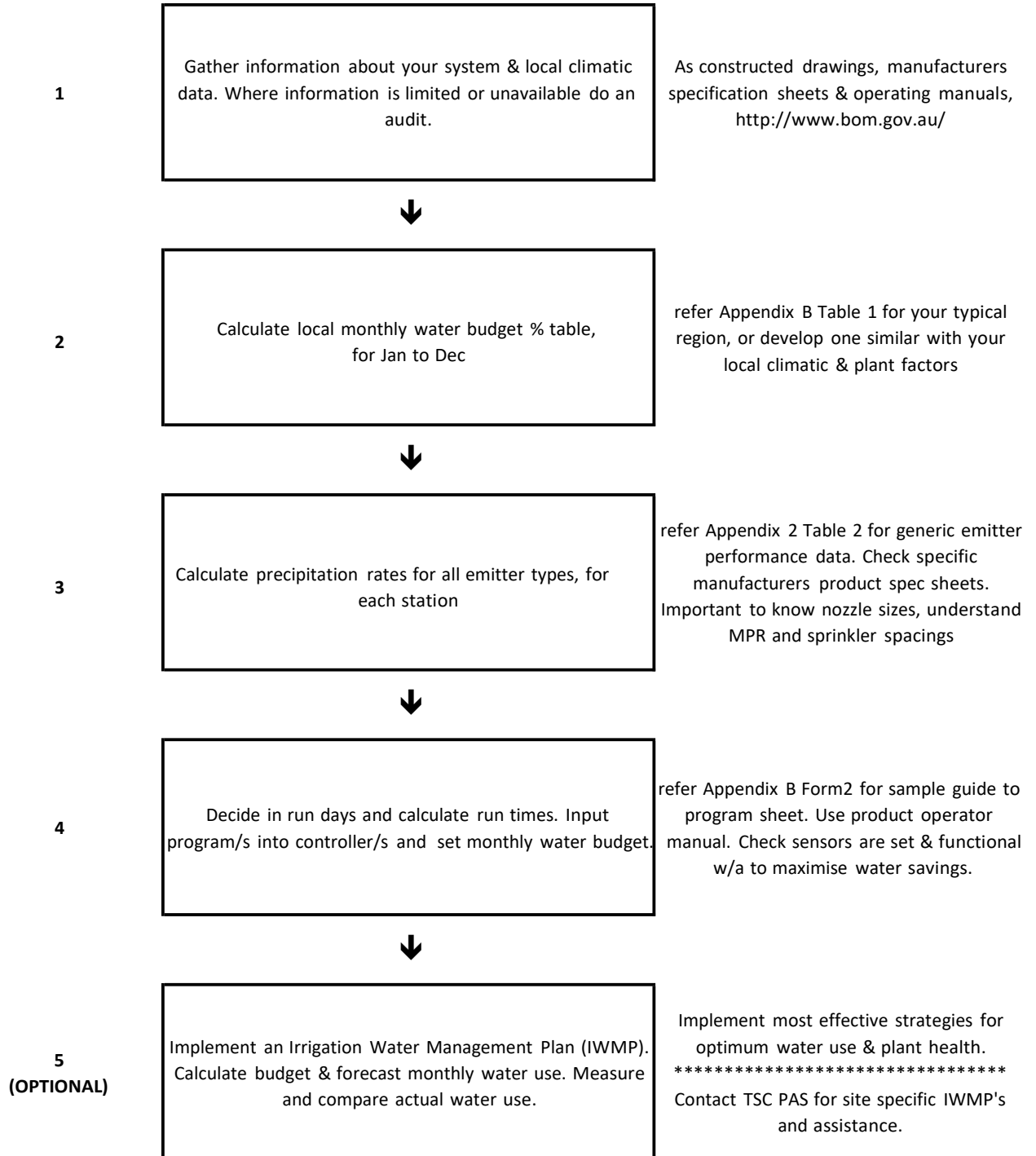
### Irrigation Water Management Plan (IWMP)

### TIPS

**NOTE:** \* Used as a guide for stand-alone & establishment programming.

May not apply for ET based programs remotely controlled by central (IMMS)

#### STEPS



**Chart 2**

**94. Appendix B: Tables**

- 94.1 BOM data & Monthly water budget
- 94.2 Irrigation emitter performance data
- 94.3 Pipe flow limits
- 94.4 Solenoid valve flow & cable run limits

## Average shire weather data & Irrigation water budget estimates

Peak Month (100%) 30.8

### Monthly Water Budget

\* Estimates based on nearest Hinze Dam BOM site 040584 for average historical data

Month	Eo, mm/dy	SC+Et factors	Irrig, mm/wk	Water Budget, %
January	5.2	0.8	29.1	95%
February	5.0	0.8	28.0	91%
March	4.3	0.8	24.1	78%
April	3.5	0.8	19.6	64%
May	2.7	0.8	15.1	49%
June	2.3	0.8	12.9	42%
July	2.6	0.8	14.6	47%
August	3.2	0.8	17.9	58%
September	4.3	0.8	24.1	78%
October	4.9	0.8	27.4	89%
November	5.1	0.8	28.6	93%
December <sup>^</sup>	5.5	0.8	30.8	100%

**Notes:**

1. ^ Peak month = 100% water budget in controller monthly settings. Manually adjust
2. For controllers without ET system, adjust controllers global water budget % monthly based on historical climatic data.
3. Sensors to adjust &/or shut down for local rainfall events or environmental conditions
4. For controllers linked with IMMS ET System water budgets can be adjusted automatically based on current actual climatic conditions

Water budget assumes no rainfall, refer local BOM data for rainfall statistics.

Table1

**Sprinkler & Emitter performance data\***  
(design guide @ nominal pressure & spacings)

\*Based on square spacing noted using 360° arcs unless arc specifically noted – recalc for varied spacings & rotors with varied arcs

Emitter type	Make/Model	Pressure, kPa	Nozzle #	Arc, °	Radius, m	Flow, l/m	Flow, l/s	Flow, m³/h	Spacing*, D	Precip, mm/h	Peak IR mm/wk	Peak IT min/wk
Spray, small	ProSpray-100/300	200	8F (MPR)	360	2.4	4.0	0.07	0.24	2.1	54.3	30.8	34
Spray, mid	ProSpray-100/300	200	12F (MPR)	360	3.7	9.5	0.16	0.57	3.3	52.2	30.8	35
Spray, full	ProSpray-100/300	200	15F (MPR)	360	4.6	14.1	0.24	0.85	4.2	48.1	30.8	38
Rotary spr, small	ProSpray-100/300	300	MP1000	360	4.3	2.9	0.05	0.18	4.0	11.0	30.8	168
Rotary spr, mid	ProSpray-100/300	300	MP2000	360	6.1	5.8	0.10	0.35	5.5	11.5	30.8	161
Rotary spr, full	ProSpray-100/300	300	MP3000	360	9.1	14.4	0.24	0.86	8.0	13.5	30.8	137
Rotor, small	I-20-04-SS	350	8	360	13.1	32.6	0.54	1.96	11.0	16.2	30.8	114
Rotor, mid	I-25-04-SS	400	15	360	17.4	53.7	0.90	3.22	16.0	12.6	30.8	147
Rotor, large/sports	I-35-06-SS	450	21	360	18.9	70.1	1.17	4.21	17.0	14.6	30.8	127
Rotor, parks/low press	I-60-SS	400	15	360	18.6	56.3	0.94	3.38	17.0	11.7	30.8	158

Emitter type	Make/Model	Pressure, kPa	Mx run, 13mm	Radius, m	Flow, l/m	Flow, l/s	Flow, m³/h	Spacing*, D	Precip, mm/h	Peak IR mm/wk	Peak IT min/wk
Drip, 2.35 lph @ 30cm	Hunter PLD	250	70	0.3	0.039	0.0007	0.0024	0.3	26.1	30.8	71
Drip, 2.35 lph @ 40cm~	Hunter PLD	250	90	0.4	0.039	0.0007	0.0024	0.4	14.7	30.8	126

~ Use 0.4m drip emitter spacing x 0.4m drip tube lateral spacing most soil types and landscape applications except for turf in free draining sandy soil, use 0.3m x 0.3m spacings.

# Use matched precipitation rate nozzle selection for mixture arcs <360°, or use dedicated station for specific arcs (radius req't's) & adjust precip rate (stations times) to suit

Peak IR (100% Water budget) = ave irrigation requirement (mm per week) during peak month (Dec - refer below), Peak IT = Irrigation time (min/week) to apply IR.

For establishment, apply IT/7 daily and taper off fortnightly until normal maintenance regime - then generally apply program time of IT/2, twice per week mid-season^ (spring & autumn)

^ as a guide pending current season, soil & plant types, extend irrigation interval in winter to say once per week, reduce interval in summer to three times per week.

Table2

**Pipe Capacity Chart**  
 (design guide max\*)

Mains, MDPE	PN	FLOW, l/s	Friction Loss
		Qmax @ 1.1 m/s	Hf% @ 1.1m/s
110	12.5	7.5	1.2
90	12.5	5.0	1.5
75	12.5	3.5	1.9
63	12.5	2.4	2.3
50 (min)	12.5	1.5	3.0

Note: (\*) based on individual one way routes, double for ring mains.

Laterals, MDPE	PN	Qmax @ 1.6 m/s	Hf% @ 1.6m/s
75	12.5	5.0	3.7
63	12.5	3.5	4.5
50	12.5	2.2	5.9
40	12.5	1.4	7.7
32 (min)	12.5	0.9	10.3

Drip manifolds, LDPE	PN	Qmax @ 1.5 m/s	Hf% @ 1.6m/s
25 (min)	3	0.75	11.0
32	3	1.25	8.0

% = m/100m

Table3

**ULV Cable Run Lengths Chart**  
 (design guide max\*)

\* Based on individual cable per solenoid valves routes.  
 May use multicore cables. Use 1x active core per valve

Tycab, Tyflo

Std - actives	PN	Resist Ohm/km	Max run (m)
1.5mm <sup>2</sup> (min)	7/050	13.6	200
2.5mm <sup>2</sup>	7/067	7.4	400

Std - common	PN	Resist Ohm/km	Max run (m)
2.5mm <sup>2</sup> (min)	7/067	7.4	400.0

Run common in star routes (not ring), use multiple common routes where practical

Decoder - Jacketed Twin Twist	PN		Max run (m)
2x 2.1mm <sup>2</sup> (min)	ID1BLU		2000
2x 3.3mm <sup>2</sup>	ID2BLU		3500

Table4(a)

**Automatic Control Valve Flow Chart**  
 (design guide max\*)

Std - ICV	Flow, l/s	Hf, m (Globe)
25mm	1.5	2.5
40mm	4.0	2.5
50mm	6.0	2.5
80mm	12.5	2.9

Master Valve

Dorot 100mm D47	26	2.0
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Table4(b)

**95. Appendix C: Forms**

- 95.1 Irrigation pre-start checklist
- 95.2 Irrigation program data sheet
- 95.3 Irrigation inspection &/or maintenance report
- 95.4 Irrigation handover checklist

**FORM 1: IRRIGATION PRE-START CHECKLIST**

TSC Phone : 07 6670 2400

TSC Fax : 07 6670 2429

**Attn: TSC Parks Asset Supervisor**

TSC Email : tsc@tweed.nsw.gov.au

Time: \_\_\_\_\_

Project: \_\_\_\_\_

Date: \_\_\_\_\_

Address: \_\_\_\_\_

TSC ref # \_\_\_\_\_

Job # \_\_\_\_\_

Pre-start coordinator / phone: \_\_\_\_\_ / \_\_\_\_\_

Task	Check	Date	Comments / Follow up	Int
Design submitted & approved	<input type="radio"/>			
Irrigation drawings avail on-site	<input type="radio"/>			
TSC Irrigation Specifications on-site	<input type="radio"/>			
Works by others confirmed	<input type="radio"/>			
Review site layout &/or irrig setout	<input type="radio"/>			
Construction program, start-finish	<input type="radio"/>			
Inspection &/or hold points req'd	<input type="radio"/>			
Conduits &/or penetrations req'd	<input type="radio"/>			
Existing services drawings	<input type="radio"/>			
Dial before dig / 1300 locate	<input type="radio"/>			
Water supply infrastructure avail	<input type="radio"/>			
Water supply capacity	<input type="radio"/>			
Power supply infrastructure avail	<input type="radio"/>			
Power supply capacity (if pump req'd)	<input type="radio"/>			
Record adjustments on as constructed	<input type="radio"/>			
Maintenance period, duration	<input type="radio"/>			
Maintenance period, responsibilities	<input type="radio"/>			
On maintenance handover, est date	<input type="radio"/>			
SIM card for ACC GSM, req'd	<input type="radio"/>			
	<input type="radio"/>			

Attachments (list):	Water meter reading	Date
	<input type="radio"/>	Pre start
	<input type="radio"/>	

Irrigation Contractor: \_\_\_\_\_ Phone: \_\_\_\_\_

Irrigation site supervisor or foreman: \_\_\_\_\_ Phone: \_\_\_\_\_

Main contractor or project manager: \_\_\_\_\_ Phone: \_\_\_\_\_

TSC Parks Irrigation Asset Foreman: \_\_\_\_\_ Phone: \_\_\_\_\_

Office	Design approved TSC RSU (sign): _____	Date: _____
--------	---------------------------------------	-------------



**Form 2: Irrigation Program Scheduling Sheet**

IMMS Site name: \_\_\_\_\_ Project #: \_\_\_\_\_ IMMS/PH #: \_\_\_\_\_ By: \_\_\_\_\_ Int: \_\_\_\_\_ **Current WB set**  
 Site Address: \_\_\_\_\_ Link to ET sys #: \_\_\_\_\_ SIM #: \_\_\_\_\_ Position: \_\_\_\_\_ Date: \_\_/\_\_/\_\_\_\_ **\_\_\_\_\_%**

Total irrigated area (est), m<sup>2</sup>: \_\_\_\_\_ Rain-Clik: \_\_\_\_\_ (Y/N) **Available Irrigation Days**  
 Flow-Clik: \_\_\_\_\_ (Y/N) **Monday  Tuesday  Wednesday  Thursday  Friday  Saturday  Sunday**

Sheet

**Irrigation Window**

Earliest start time  
 Latest finish Time

of  
 Sheets

Water Budget for Peak Month **100%** **Peak Month Irrig Req'd(@ 100%) 30.8**  
 (BOM Stn:Hinze Dam BOM Site 040584) **mm/wk**

<Peak month = December>

Controller # (& dec address w/a)	Station #	Sprink type -Nozzle/Arc - Loc	# Sprink/Rotors	Prep rate, mm/hr	Estimated Flow, l/m	Turf	Start time	Gardens	Start time	Start time	Flow, kL/wk WB @ 100%	
						Program A	Program B	Program C				
						Run time, min	Days	Run time, min	Days	Run time, min	Days	
						<b>Max Hours (@ 100%)</b>				<b>Total Volume</b>		<b>kL/week (WB @100%)</b>

Note: May use cycle & soak programming feature to split run times in half with 2 repeats in same night, if runoff were to occur

**Form 3: Irrigation Inspection &/or Maintenance Report**

TSC Email : tsc@tweed.nsw.gov.au

TSC fax: (02) 6670 2429

TSC phone: (02) 6670 2400

Attn: TSC Parks Asset Supervisor

Date: \_\_\_\_\_

Service person: \_\_\_\_\_

Site name: \_\_\_\_\_

Report sheet #: \_\_\_\_\_

Start time: \_\_\_\_\_

Site Address: \_\_\_\_\_

of # sheets: \_\_\_\_\_

Time finished: \_\_\_\_\_

Site contact person: \_\_\_\_\_

Water meter reading (start): \_\_\_\_\_

Service Company or TSC: \_\_\_\_\_

Site contact phone: \_\_\_\_\_

Water meter (finish): \_\_\_\_\_

Service contact phone: \_\_\_\_\_

Controller #	Station #	Station details: location, garden/turf, type sprinklers	Controller: operation, runtime, days, WB%	Valves tags, level/grade, ball vlv, filters clean flow/press reg setting	Sprinklers: level/grade, arc/rad set, clog/leaks	Comments: actions, timeframe, by who,	completed int/date

Further instructions:  
\_\_\_\_\_  
\_\_\_\_\_

Attachments (list):  
As constructed dwg, available   
\_\_\_\_\_

Office	TSC RSU Approved:	Sign:	Date:
--------	-------------------	-------	-------

**FORM 4: IRRIGATION HANDOVER CHECKLIST**

TSC Phone : 07 6670 2400

TSC Fax : 07 6670 2429

Attn: TSC Parks Asset Supervisor

TSC Email : tsc@tweed.nsw.gov.au

Time: \_\_\_\_\_

Project: \_\_\_\_\_

Date: \_\_\_\_\_

Address: \_\_\_\_\_

TSC ref # \_\_\_\_\_

Job # \_\_\_\_\_

Handover coordinator / phone: \_\_\_\_\_ / \_\_\_\_\_

*Only check boxes applicable & completed. Mark N/A where not applicable*

Task	Check	Date	Comments / Follow up	Int
Check drawings & specification are met	<input type="checkbox"/>			
System flushed	<input type="checkbox"/>			
Operation & functions checked	<input type="checkbox"/>			
Backflow test certificate, and Q/H capacity test	<input type="checkbox"/>		Qmin ___ l/s @ ___ kPa, Qmax ___ l/s @ ___ kPa	
Mainline integrity & supply capacity, verify	<input type="checkbox"/>			
Filters cleaned & pressure reg's set (w/a)	<input type="checkbox"/>			
Sprinklers to grade & arc/radius set	<input type="checkbox"/>			
Drip tube pegged, covered, flush & press test	<input type="checkbox"/>			
Valves to grade, tagged, press set, elect test	<input type="checkbox"/>			
Controller mounted, programmed, elect test	<input type="checkbox"/>			
Monthly water budget % set	<input type="checkbox"/>			
Sensors (flow & weather) connected & tested	<input type="checkbox"/>			
Practical Completion achieved	<input type="checkbox"/>			
ITP's & Defects list (w/a) completed	<input type="checkbox"/>			
Earth resistance test (ohms), & special requirements	<input type="checkbox"/>			
As constructed drawings, completed	<input type="checkbox"/>			
Operations manuals, completed	<input type="checkbox"/>			
Maintenance staff training, completed	<input type="checkbox"/>			
On maintenance, completed or passed	<input type="checkbox"/>			
Maintenance period, required	<input type="checkbox"/>			
Off maintenance, completed or passed	<input type="checkbox"/>			
SIM phone number for ACC-GSM, w/a	<input type="checkbox"/>			
IMMS details loaded & operation, w/a	<input type="checkbox"/>			
	<input type="checkbox"/>			

Defects (list):	Flow meter readings	Date
	<input type="checkbox"/>	Practical Completion
	<input type="checkbox"/>	On maintenance
	<input type="checkbox"/>	Off maintenance
Attachments or further defects list:		<input type="checkbox"/>

Irrigation Contractor: \_\_\_\_\_ Phone: \_\_\_\_\_

Irrigation maintenance foreman: \_\_\_\_\_ Phone: \_\_\_\_\_

Main contractor or project manager: \_\_\_\_\_ Phone: \_\_\_\_\_

TSC Parks Irrigation Asset Foreman: \_\_\_\_\_ Phone: \_\_\_\_\_

Office	Approved by TSC RSU (sign): _____	Date: _____
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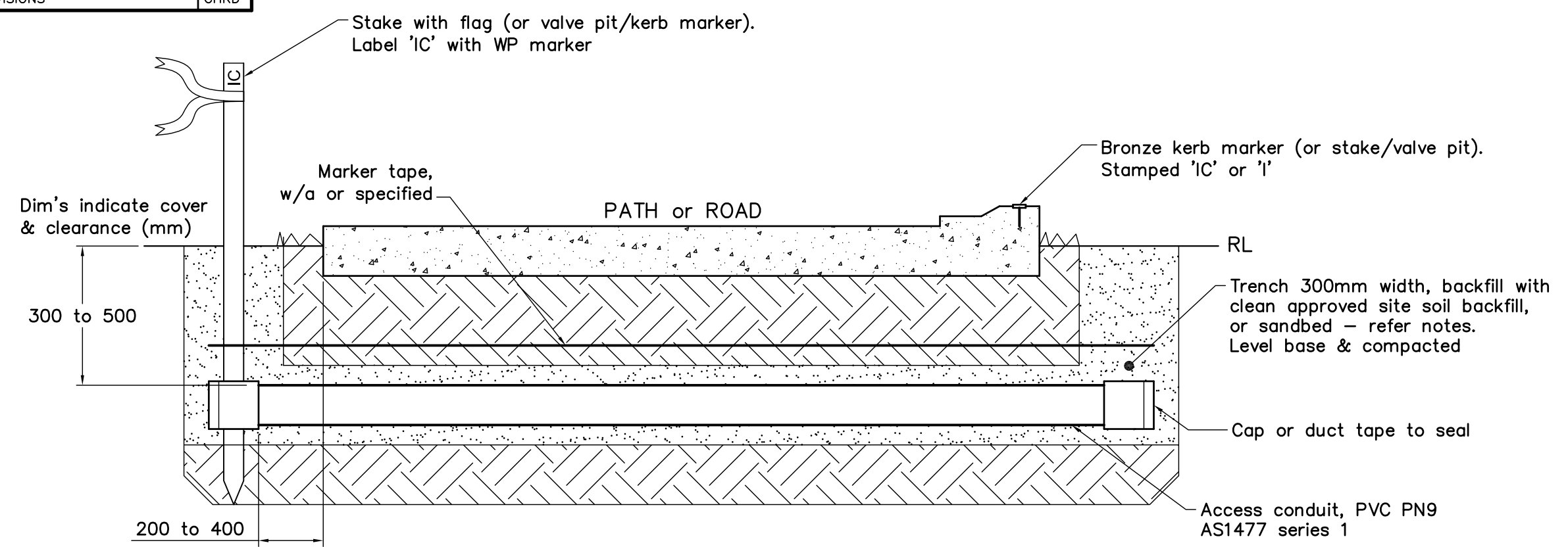
## 96. Appendix D: Standard Construction Details

96.1	Section A	Preliminaries & Access
	• TSP-IA-SC-A1	Irrigation Access Conduits
96.2	Section B	Water Supply
	• TSP-IA-SC-B1	Tank
	• TSP-IA-SC-B2	Pump Station
96.3	Section C	Control System
	• TSP-IA-SC-C1	Irrigation Central Control
	• TSP-IA-SC-C2	Irrigation Controller, Wall Mount
	• TSP-IA-SC-C3	Irrigation Controller, Pedestal Mount
	• TSP-IA-SC-C4	Weather Sensor Post Mount
	• TSP-IA-SC-C5	Master Valve & Flow Sensor
	• TSP-IA-SC-C6	Solenoid Valve
96.4	Section D	Pipe & Valves
	• TSP-IA-SC-D1	Backflow Valve Assembly
	• TSP-IA-SC-D2	Backflow Enclosure (Ref TSC dwg # S.D. 708)
	• TSP-IA-SC-D3	Trench
	• TSP-IA-SC-D4	Isolation Valve, Small (BSP)
	• TSP-IA-SC-D5	Isolation Valve, Large (FLG)
	• TSP-IA-SC-D6	Quick Coupling Valve
	• TSP-IA-SC-D7	Air Valve, Main
96.5	Section E	Irrigation Sprinklers
	• TSP-IA-SC-E1	Garden Sprinklers
	• TSP-IA-SC-E2	Turf Sprinklers
96.6	Section F	Micro Irrigation
	• TSP-IA-SC-F1	Drip Layout
	• TSP-IA-SC-F2	Drip Cross Section
	• TSP-IA-SC-F3	Secondary Drip Filter
	• TSP-IA-SC-F4	Air-Vac Valve, Drip

- TSP-IA-SC-F5 Flush Valve, Drip

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**NOTES:**

1. Where a irrigation access conduits plan is not available the irrigation designer is to facilitate developing an access conduits plan in consultation with the projects principal consultant prior to construction
2. Generally access conduits are the responsibility of either main contractor, builder or civil contractor. The requirement is to those responsible to follow this detail so as not to create logistics issues or program delays.
3. As a guide unless otherwise specified, minimum 100mm access conduit for up to; 1x 63mm main with 1x 32mm lateral plus 1x 13 core cable
4. Where requirement exceeds above, allow larger access conduits &/or multiple conduits
5. Access conduits must be straight, undamaged & continuous
6. Access conduits must be installed within reasonable depths & clearances nominated above
7. Access conduits must be clear of rubble, debris, obstructions, and wildlife
8. All access conduits must be clearly marked on-site with either stakes, kerb markers &/or valve pits. Where access conduit locations vary from original conduit design plan, mark up on as constructed access conduits site drawings
9. Request site instruction from project manager for additional conduits, locating of unmarked conduits, or special excavation
10. Maintain 50mm separation between pipes in common trenches
11. Generally trench only what can be backfilled the same day
12. Barricade any unfilled pits or trenches at end of each day, or during excavation as required to maintain site safety

**IRRIGATION ACCESS CONDUITS DETAIL**  
NTS

DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	

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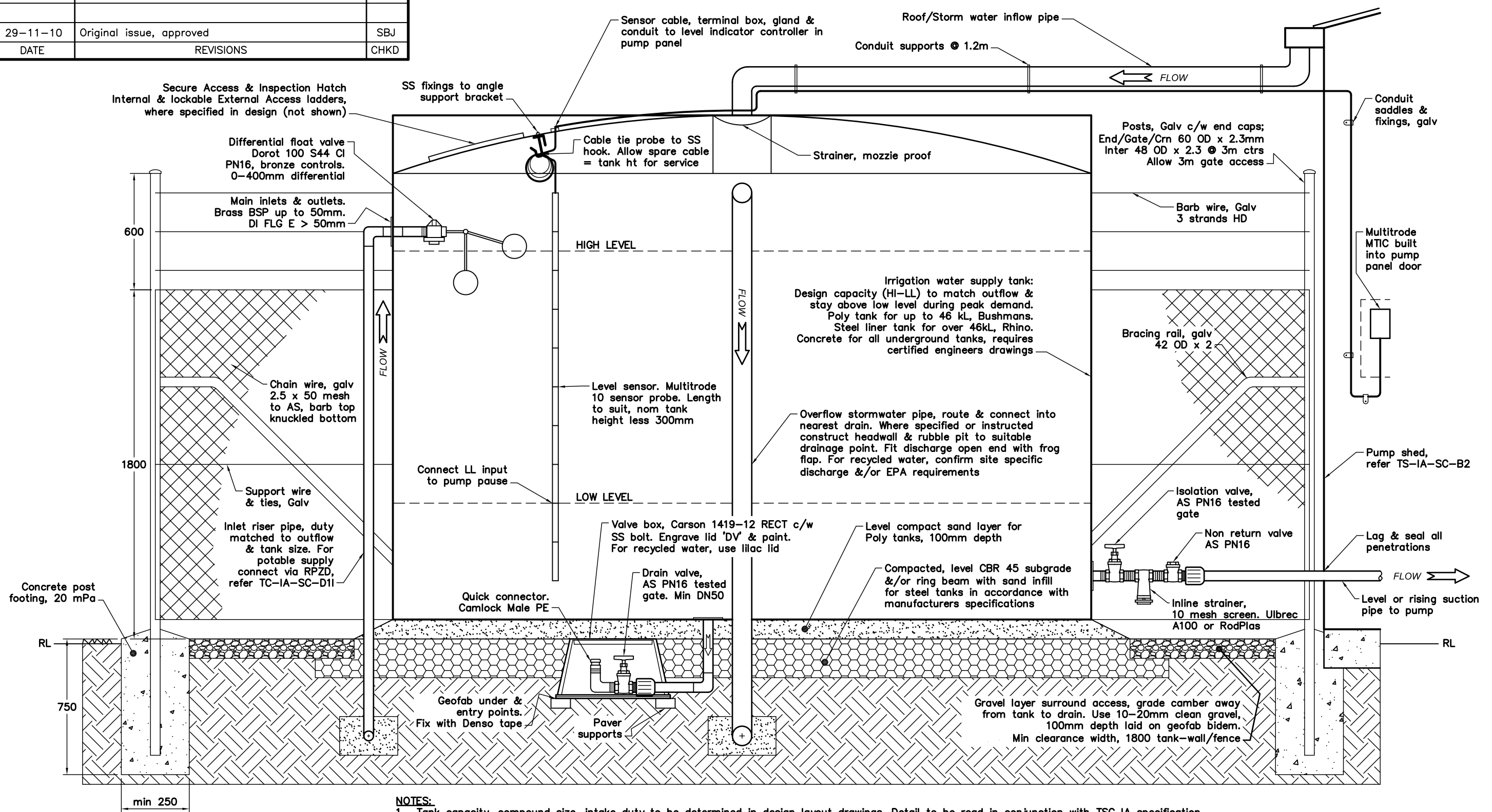
**ENGINEERING & OPERATIONS – RSU**

IRRIGATION ASSETS SPECIFICATION  
STANDARD CONSTRUCTION DETAILS  
IRRIGATION ACCESS CONDUITS DETAIL

DATE: 29 – 11 – 2010
DRAWING No: TSC-IA-SC-A1
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**NOTES:**  
 1. Tank capacity, compound size, intake duty to be determined in design layout drawings. Detail to be read in conjunction with TSC IA specification  
 2. Extent of works within irrigation scope to be determined within specific project contract

**IRRIGATION WATER SUPPLY TANK DETAIL**  
 NTS

DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	

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**ENGINEERING & OPERATIONS – RSU**  
 IRRIGATION ASSETS SPECIFICATION  
 STANDARD CONSTRUCTION DETAILS  
 IRRIGATION WATER SUPPLY TANK DETAIL

DATE: 29 - 11 - 2010	
DRAWING No: TSC-IA-SC-B1	
Rv. 0	

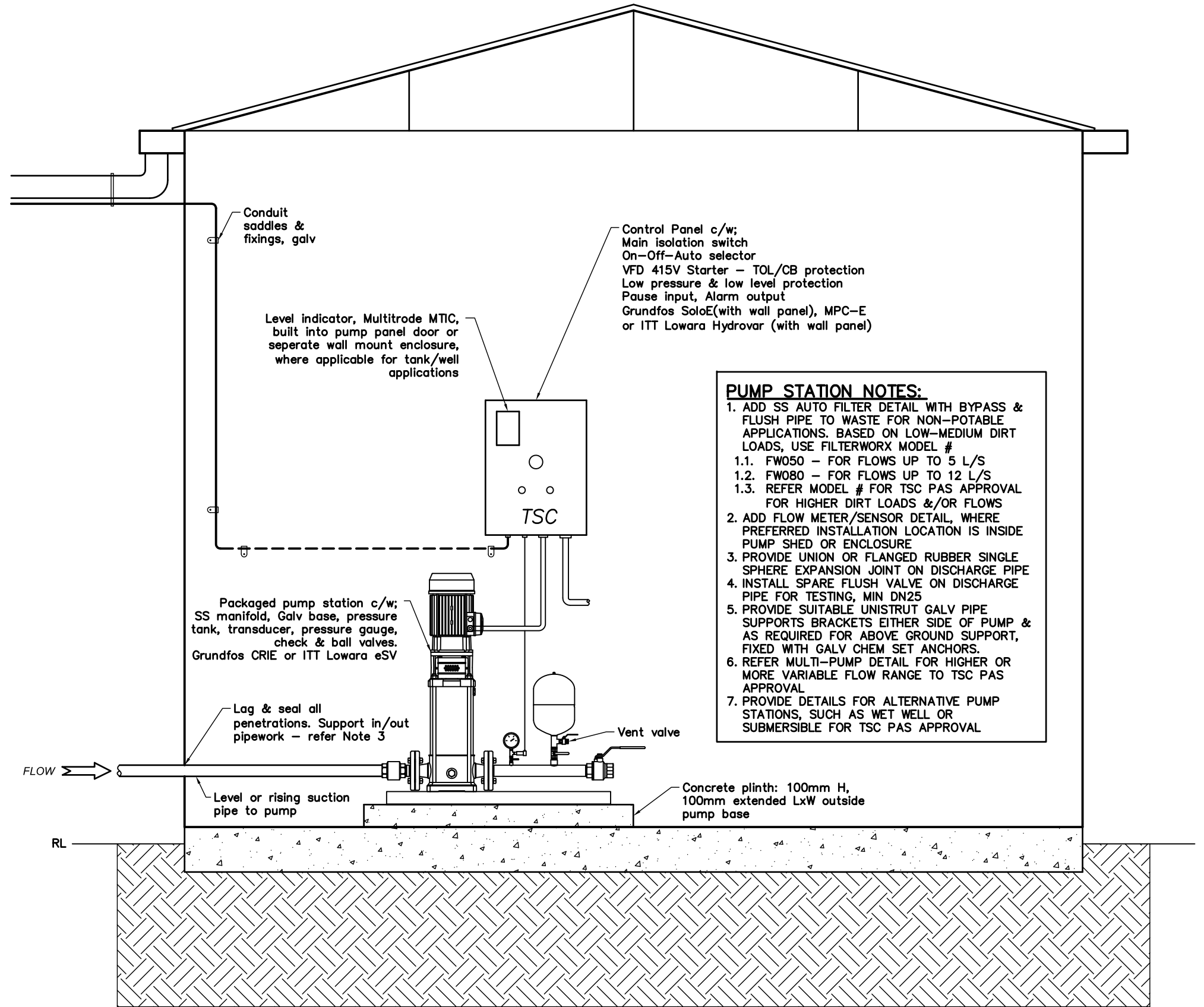


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**Building & Construction Notes:**

1. Pump enclosure or shed provided by TSC, and to be manufactured & erected by approved TSC shed builder.
2. Detailed structural drawings to be submitted for approval prior to construction. The building contractor is responsible for all structural elements, engineering certification & building approvals, where required.
  - 2.1. Shed wind rating, to suit site location
  - 2.2. Slab construction, conduct Geotechnical test for footings and specify foundations to suit site soil type
3. Min internal bldg Dim's;
  - 3.1. 3x4m for single pump unit )
  - 3.2. 4x6m for multi-pump unit/s
  - 3.3. For smaller units, nom 1.2x1.8m enclosures similar to SCD S.D.708 may be used at TSC PAS discretion
4. Min Eave height, 3.0m\*. Roof pitch 15d(min).
5. Min clearance\* from top of pump/motor to roof eave = 1.25 x pump/motor ht
6. Overhead gantry with multi-directional pulley optional, where specified. Increase min eave height clearance from pump to gantry to suit. Where applicable, Min lift capacity is 1.25 x pump & motor weight, and gantry to be certified by registered professional engineer
7. Building construction, unless otherwise specified:
  - 7.1. Type, Colourbond,
  - 7.2. Finish, 'Wilderness Green'.
  - 7.3. Gable roof, corrugated colourbond
  - 7.4. Ventilation: 1x whirly bird roof vents & 1x 600x900 fix louvre wall vent with security mesh
  - 7.5. All openings and security mesh to be vermin proof
  - 7.6. Include; gutters, barge flashing & downpipes
8. Master key all door locks
9. Lag all pipework through walls. Support all pipework and thrust block where required
10. The customer (TSC) is responsible for all structural elements, engineering certification & building approvals, where required
11. External metered power supply & distribution board generally by others unless otherwise specified. The distribution board would include main circuit breaker with separate circuits for pump control panel, lighting and general power. Surge/lightning/overload protection is required at distribution board.
12. The building contractor shall allow for internal power, including;
  - 12.1. wiring to pump panel &/or motor/s
  - 12.2. 2x double fluoro battens centrally located, with switch beside access door
  - 12.3. Allow 3x double 240V 10A GPO's, locate one @ distribution board, one @ filter controller, and one at discharge pipe (future/dosing)
  - 12.4. Allow electrical access routes for all cabling, via cable zones(trench/tray) or conduits, as required



**PUMP STATION NOTES:**

1. ADD SS AUTO FILTER DETAIL WITH BYPASS & FLUSH PIPE TO WASTE FOR NON-POTABLE APPLICATIONS. BASED ON LOW-MEDIUM DIRT LOADS, USE FILTERWORX MODEL #
  - 1.1. FW050 - FOR FLOWS UP TO 5 L/S
  - 1.2. FW080 - FOR FLOWS UP TO 12 L/S
  - 1.3. REFER MODEL # FOR TSC PAS APPROVAL FOR HIGHER DIRT LOADS &/OR FLOWS
2. ADD FLOW METER/SENSOR DETAIL, WHERE PREFERRED INSTALLATION LOCATION IS INSIDE PUMP SHED OR ENCLOSURE
3. PROVIDE UNION OR FLANGED RUBBER SINGLE SPHERE EXPANSION JOINT ON DISCHARGE PIPE
4. INSTALL SPARE FLUSH VALVE ON DISCHARGE PIPE FOR TESTING, MIN DN25
5. PROVIDE SUITABLE UNISTRUT GALV PIPE SUPPORTS BRACKETS EITHER SIDE OF PUMP & AS REQUIRED FOR ABOVE GROUND SUPPORT, FIXED WITH GALV CHEM SET ANCHORS.
6. REFER MULTI-PUMP DETAIL FOR HIGHER OR MORE VARIABLE FLOW RANGE TO TSC PAS APPROVAL
7. PROVIDE DETAILS FOR ALTERNATIVE PUMP STATIONS, SUCH AS WET WELL OR SUBMERSIBLE FOR TSC PAS APPROVAL

- NOTES:**
1. Pump capacity, shed size to be determined in design layout drawings. Detail to be read in conjunction with TSC IA specification
  2. Extent of works within irrigation scope to be determined within specific project contract

**SINGLE IRRIGATION PUMP STATION DETAIL**  
NTS

DRAFT ISSUE

DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	



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**ENGINEERING & OPERATIONS – RSU**  
IRRIGATION ASSETS SPECIFICATION  
STANDARD CONSTRUCTION DETAILS  
IRRIGATION PUMP STATION DETAIL – SINGLE UNIT

DATE: 29 – 11 – 2010

DRAWING No:  
**TSC-IA-SC-B2**

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Rv.



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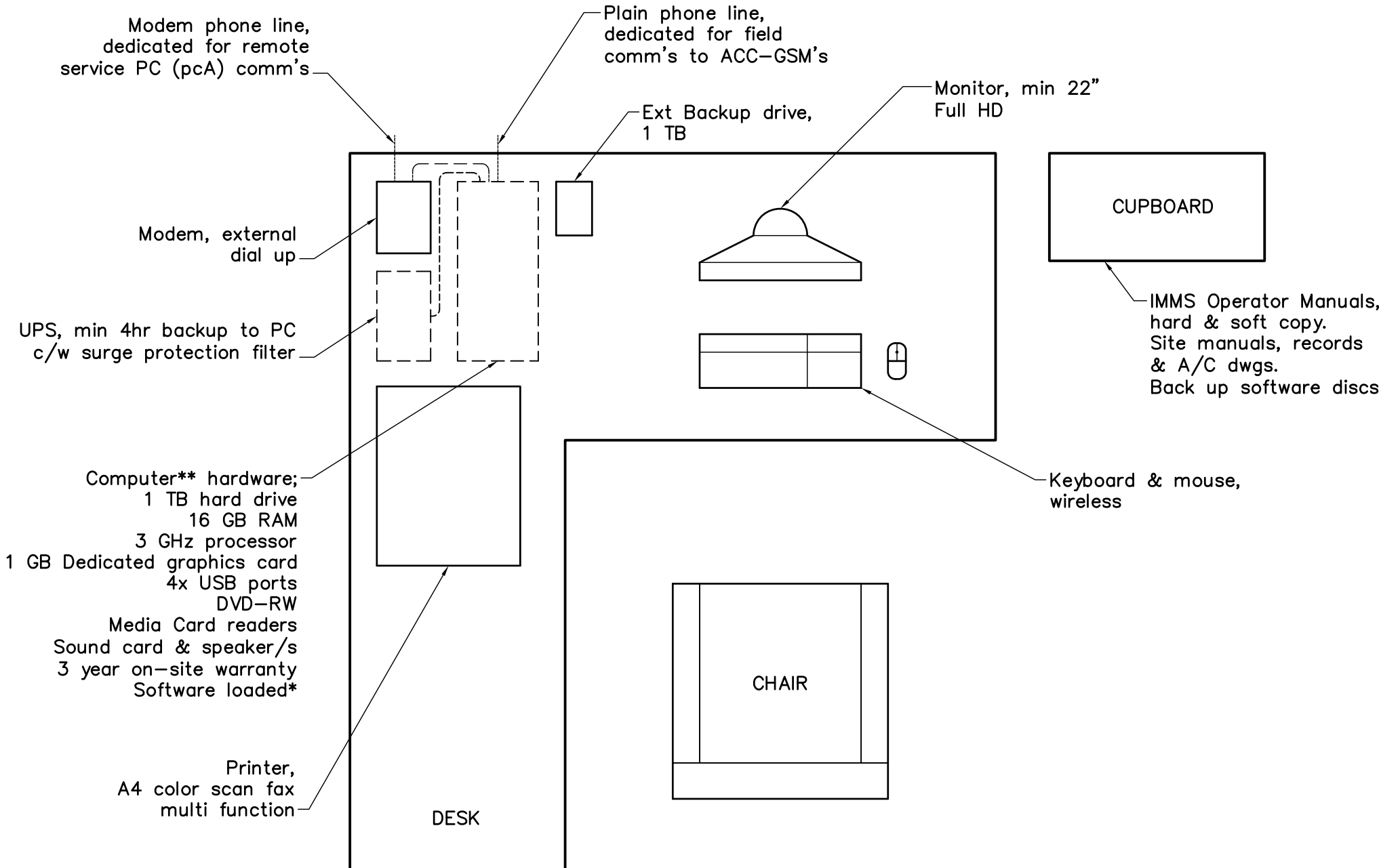
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**\* SOFTWARE requirements.**  
 Irrigation computer loaded with licensed current versions of:

- A. Windows operating system
- B. Irrigation central control, Hunter IMMS<sup>^</sup>
- C. Environmental control, Hunter ET system
- D. Administration, MS Office
- E. PDF reader, Adobe
- F. Remote management, pcAnywhere
- G. Anti virus protection, Norton


<sup>^</sup>Includes initial loading of ACC field controllers setup & programs into IMMS database

**\*\* Hardware & software requirements are subject to confirmation & approval at time of each upgrade, to meet commercial spec**



- NOTES:**
1. The computer is effectively an irrigation controller only, not networked for other purposes
  2. Furniture (desk, chair, cupboard) by others, unless otherwise noted
  3. Phone lines & power points by others unless otherwise noted
  4. Recommend full back up of PC monthly & data bases at least weekly or after changes
  5. Store copy of backup media with database separately &/or download off-site
  6. Fix shire site map to wall coded with numerical list of all field controller site names
  7. Maintain spreadsheet with estimated annual water budget vs actual usage for all sites

**TYPICAL IRRIGATION CENTRAL CONTROL DETAIL**  
 N.T.S

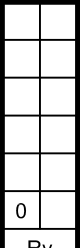
DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	

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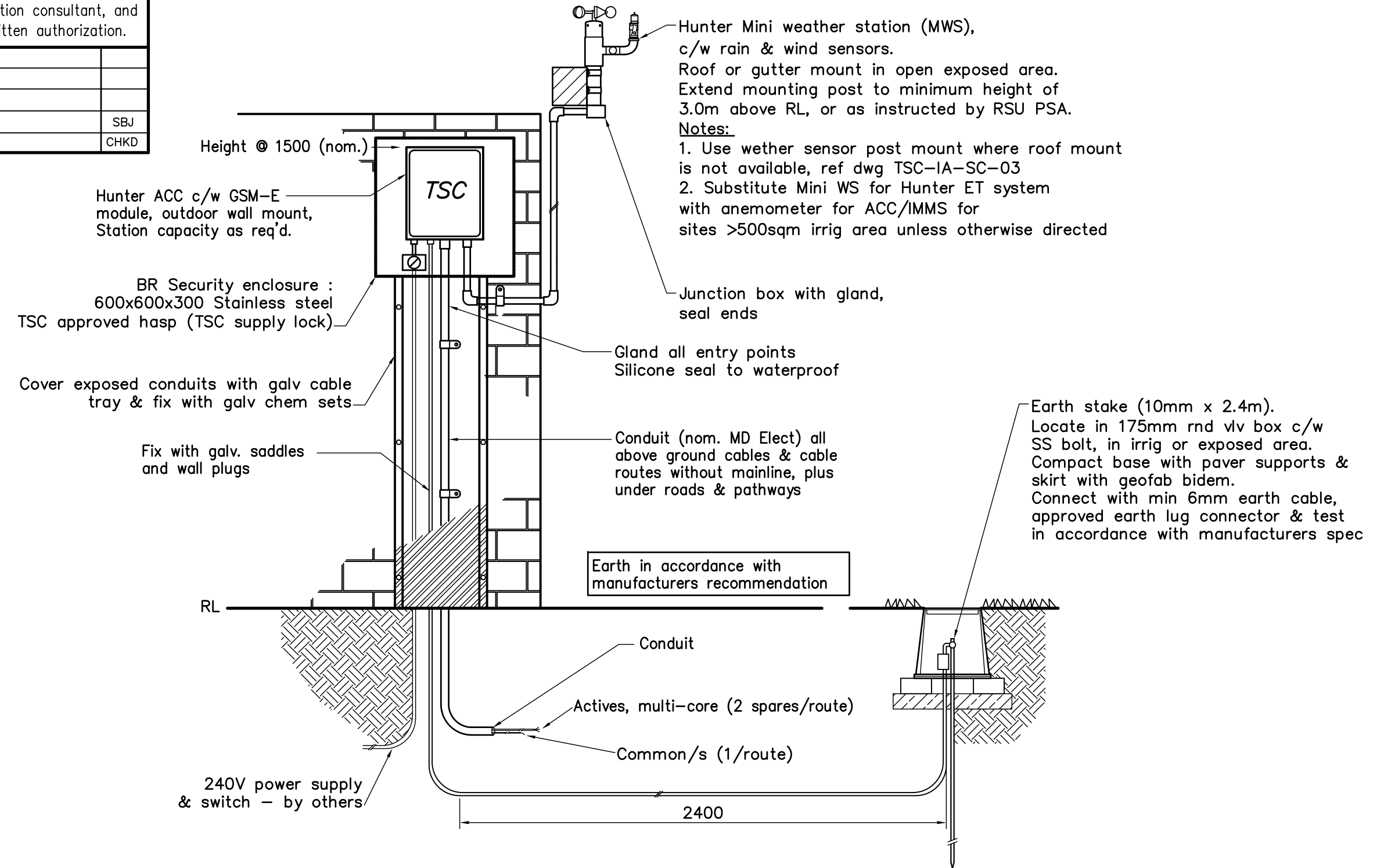
**ENGINEERING & OPERATIONS – RSU**

IRRIGATION ASSETS SPECIFICATION  
 STANDARD CONSTRUCTION DETAILS  
 IRRIGATION CENTRAL CONTROL DETAIL

DATE: 29 – 11 – 2010	
DRAWING No: <b>TSC-IA-SC-C1</b>	
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- NOTES:**
- Maximum low voltage control wire runs, controller to sol.valve:
    - (a) Actives: 1.5 sq.mm (7/050) < 230m, (b) 2.5 sq.mm (7/067) < 425m
    - (b) Common: 2.5 sq.mm (7/067) < 425m. Min cable sizes
    - (c) For cable runs > 400m use decoder system, refer spec for cable sizes
 Distances based on one active cable operating one valve.  
 Upsize common for multi-valve operation w/a, Max Vd = 8% for 24V

**TYPICAL WALL MOUNT CONTROLLER DETAIL**  
N.T.S

DESIGN: SBJ  
 DRAWN: SBJ  
 CHECK: BMac  
 PAPER: A3  
 EMAIL: tsc@tweed.nsw.gov.au



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**ENGINEERING & OPERATIONS – RSU**

IRRIGATION ASSETS SPECIFICATION  
 STANDARD CONSTRUCTION DETAILS

IRRIGATION CONTROLLER, WALL MOUNT DETAIL

DATE: 29 – 11 – 2010  
 DRAWING No:  
**TSC-IA-SC-C2**

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Rv.

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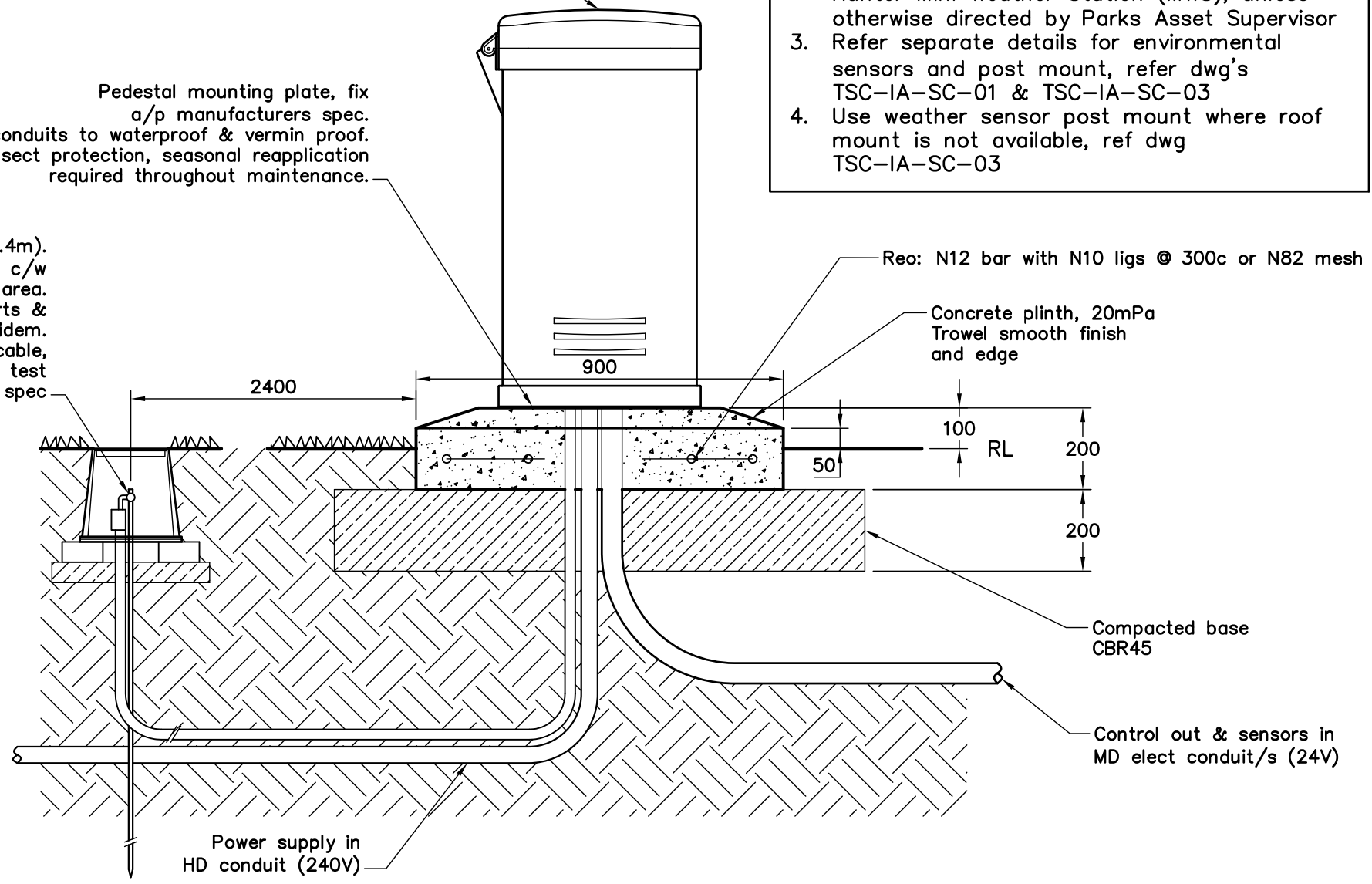
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Rv.	DATE	REVISIONS	CHKD

**Weather sensors (not shown)**  
 Connect to ACC controllers  
**Notes:**  
 1. For sites >500 sqm irrigated area, use Hunter ET sensor with anemometer for ACC/IMMS  
 2. For sites <500 sqm irrigated area, use Hunter Mini Weather Station (MWS), unless otherwise directed by Parks Asset Supervisor  
 3. Refer separate details for environmental sensors and post mount, refer dwg's TSC-IA-SC-01 & TSC-IA-SC-03  
 4. Use weather sensor post mount where roof mount is not available, ref dwg TSC-IA-SC-03

Plastic Pedestal, Hunter ACC  
 c/w GSM comm's module.  
 Station capacity as required.

Pedestal mounting plate, fix  
 a/p manufacturers spec.  
 Seal all conduits to waterproof & vermin proof.  
 Apply insect protection, seasonal reapplication  
 required throughout maintenance.

Earth stake (10mm x 2.4m).  
 Locate in 175mm rnd viv box c/w  
 SS bolt, in irrig or exposed area.  
 Compact base with paver supports &  
 skirt with geofab bidem.  
 Connect with min 6mm earth cable,  
 approved earth lug connector & test  
 in accordance with manufacturers spec



- NOTES:**
1. Min 1.5mm (7/0.50) control cables, up to 150m runs (1 per SV)
  2. 2.5mm (7/0.67) control cables, up to 400m runs (1 per SV)
  3. 2x spare actives per cable route
  4. Min 2.5mm (7/0.67) common cables, up to 400m runs, 1per cable route

**PEDESTAL MOUNT CONTROLLER DETAIL**  
 NTS

DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	

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**ENGINEERING & OPERATIONS – RSU**

IRRIGATION ASSETS SPECIFICATION  
 STANDARD CONSTRUCTION DETAILS

IRRIGATION CONTROLLER, PEDESTAL DETAIL

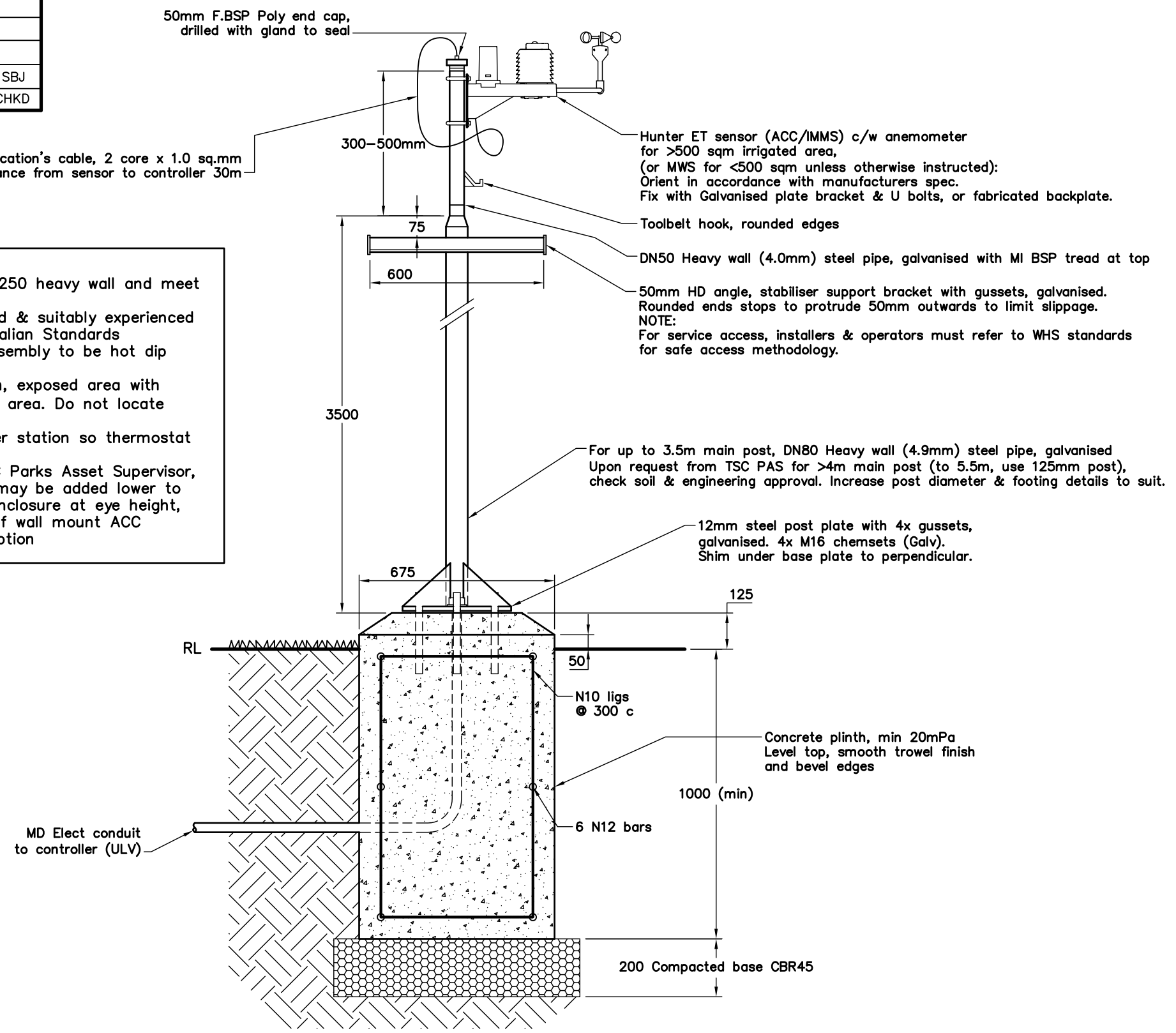
DATE: 29 - 11 - 2010	<b>TSC-IA-SC-C3</b>
DRAWING No:	
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- NOTES:**
1. All steel pipe to be grade C250 heavy wall and meet AS1074
  2. Fabricated by a fully qualified & suitably experienced boilermaker, welded to Australian Standards
  3. Complete fabricated post assembly to be hot dip galvanised to AS 4792
  4. Locate ET sensor in an open, exposed area with similar environ's to irrigation area. Do not locate close to trees or limbs
  5. For ET sensor, orient weather station so thermostat points North
  6. At the discretion of the TSC Parks Asset Supervisor, additional support brackets may be added lower to facilitate a Stainless Steel enclosure at eye height, where TSC may prefer use of wall mount ACC controller, versus pedestal option

Communication's cable, 2 core x 1.0 sq.mm  
Max distance from sensor to controller 30m



**POST MOUNT WEATHER STATION (4m ET or MWS) DETAIL**  
NTS

DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	



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**ENGINEERING & OPERATIONS – RSU**  
IRRIGATION ASSETS SPECIFICATION  
STANDARD CONSTRUCTION DETAILS  
IRRIGATION WEATHER SENSOR, POST MOUNT DETAIL

DATE: 29 – 11 – 2010

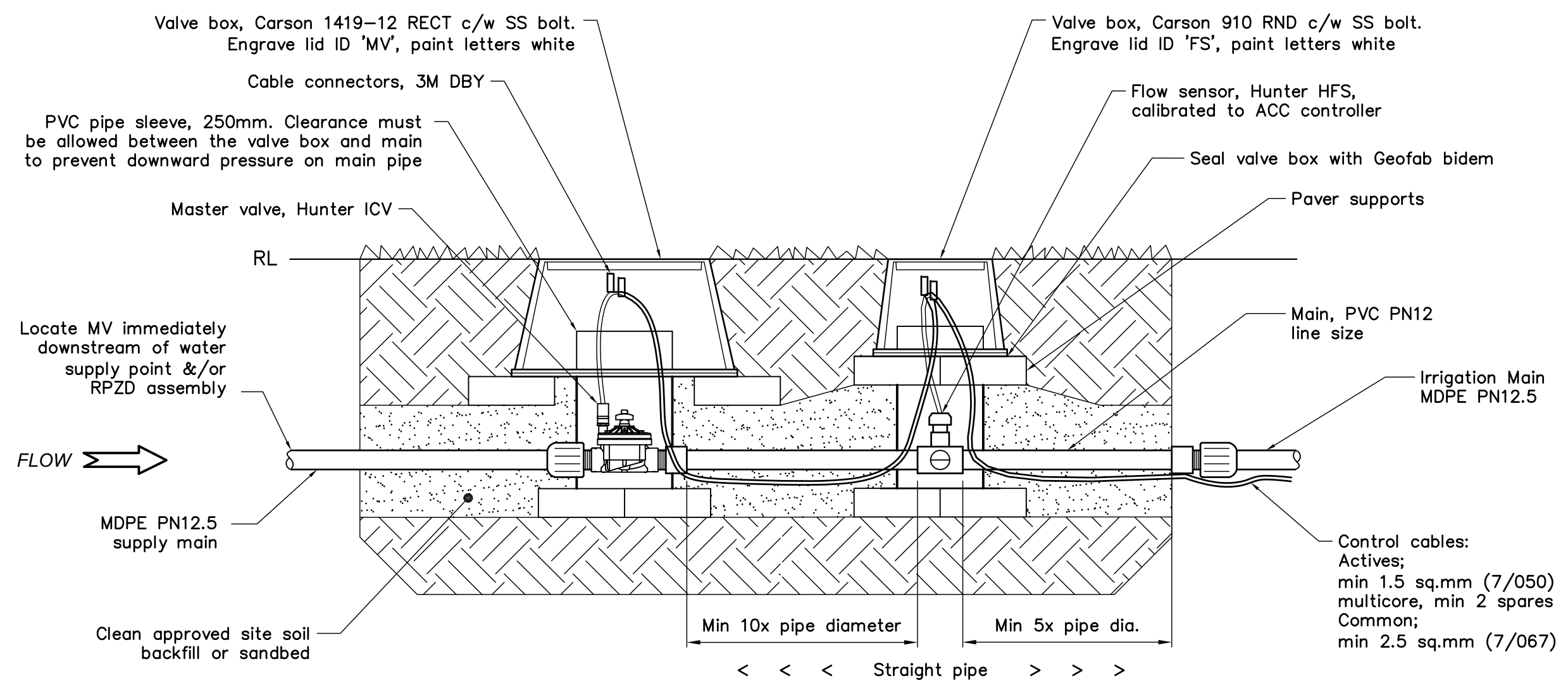
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**TSC-IA-SC-C4**

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**NOTES:**

1. Dedicated Master valve & flow sensor required at each supply point for each irrigation controller.
2. Master valve sized for maximum irrigation system design duty, maximum MV friction loss < 25kPa
3. For Potable supply, located Master valve as close as possible to water supply point and RPZD
4. For pumped systems, Master valve may not be required at discretion of designer & TSC PAS

**MASTER VALVE & FLOW SENSOR DETAIL**

NTS

DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	

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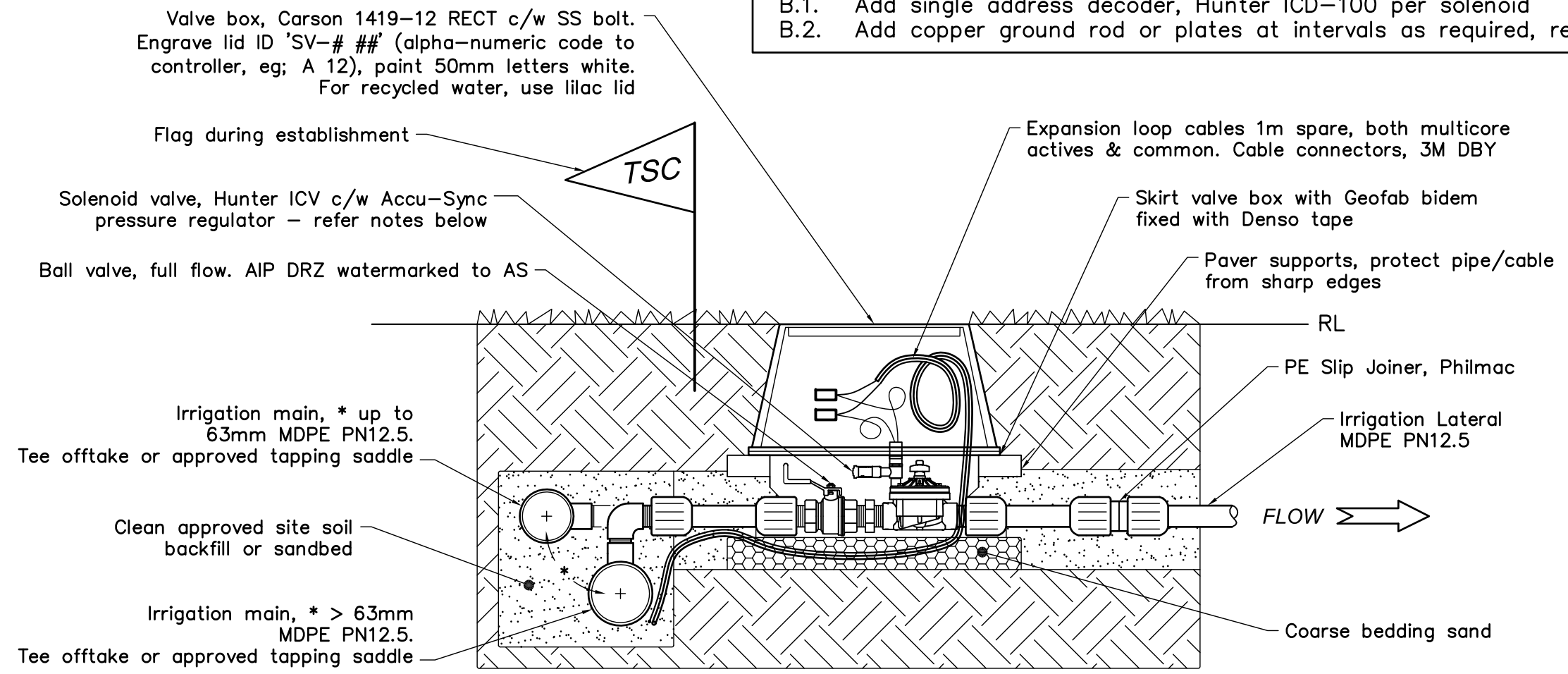
**ENGINEERING & OPERATIONS – RSU**  
 IRRIGATION ASSETS SPECIFICATION  
 STANDARD CONSTRUCTION DETAILS  
 MASTER VALVE & FLOW SENSOR DETAIL

DATE:	29 – 11 – 2010
DRAWING No:	TSC-IA-SC-C5
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**VALVE BOXES IN SPORTS TURF APPLICATIONS:**  
 A. For valve box locations in sports turf projects;  
 A.1. Locate valve boxes min 4m from field boundaries where practical  
 A.2. Option, valve boxes close to field surface or within surrounds may require 'Wondergrass' sports grade synthetic turf to be neatly cut and bonded to valve box lid with 'Wondergrass' joining glue. Use equivalent lilac syn turf for recycled water supply. Spray paint valve ID on grass using template  
**DECODER CONTROL SYSTEMS:**  
 B. For decoder applications;  
 B.1. Add single address decoder, Hunter ICD-100 per solenoid  
 B.2. Add copper ground rod or plates at intervals as required, refer specification



- NOTES:**
- Accu-Sync may not be required in the following applications;
    - where the inlet pressure is within 100kPa of design operating pressure (Ho)
    - sports fields & inlet pressure is within 100kPa of design Ho
    - systems supplied by VFD pump station & inlet pressure is within 100kPa of design Ho
  - For design maximum valve flow rates & min cable sizes refer appendix
  - Allow 2 spare cables per cable route, refer specification
  - For drip stations add secondary filter assembly & QCV per stn, refer drip irrigation & QCV SC details

**SOLENOID VALVE DETAIL**  
NTS

DESIGN: SBJ  
 DRAWN: SBJ  
 CHECK: BMac  
 PAPER: A3  
 EMAIL: tsc@tweed.nsw.gov.au



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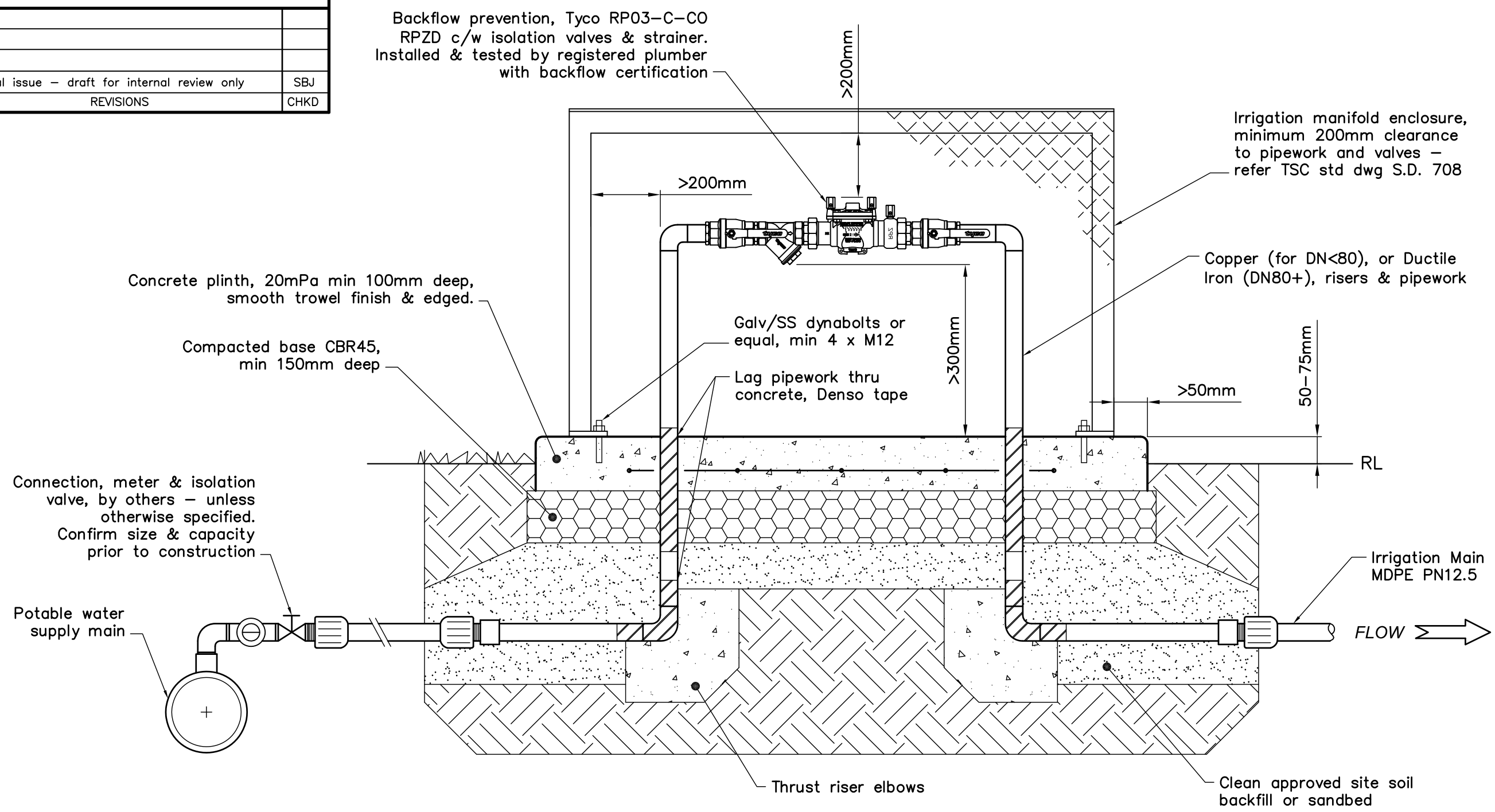
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**ENGINEERING & OPERATIONS – RSU**  
 IRRIGATION ASSETS SPECIFICATION  
 STANDARD CONSTRUCTION DETAILS  
 AUTOMATIC CONTROL VALVE DETAIL

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**TSC-IA-SC-C6**  
 0  
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**NOTES:**

1. Size supply main connection & backflow for maximum irrigation system design duty
2. Maximum backflow c/w assembly friction loss < 90 kPa

**BACKFLOW PREVENTION ASSEMBLY DETAIL – RPZD**  
NTS

DESIGN: SBJ	 <p><b>TWEED</b> SHIRE COUNCIL</p>
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	

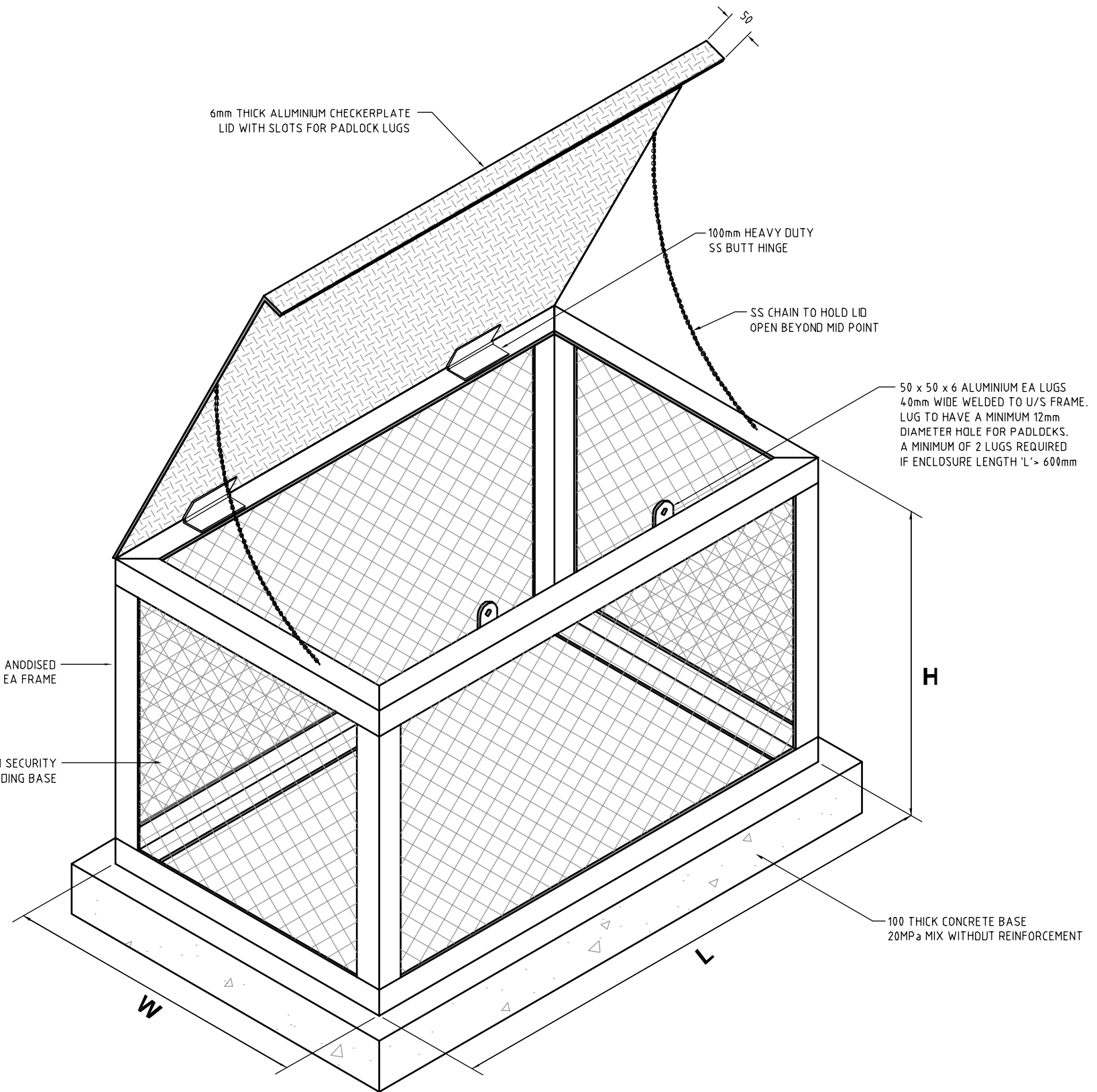
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**ENGINEERING & OPERATIONS – RSU**  
IRRIGATION ASSETS SPECIFICATION  
STANDARD CONSTRUCTION DETAILS  
BACKFLOW PREVENTION ASSEMBLY DETAIL – RPZD

DATE: 29 – 11 – 2010
DRAWING No: TSC-IA-SC-D1
0 Rv.

**NOTES:**

1. DIMENSIONS H, L & W TO BE SUFFICIENT TO PROVIDE A MINIMUM OF 200mm CLEARANCE AROUND THE VALVE & PIPE INSTALLATION.
2. ENCLOSURE TO BE MOUNTED ON 100 THICK CONCRETE BASE. LENGTH & WIDTH OF BASE TO EXTEND A MINIMUM OF 50mm BEYOND THE LENGTH & WIDTH OF THE ENCLOSURE. CONCRETE TO 20MPa MIX WITHOUT REINFORCEMENT.
3. THE FRAME IS AFFIXED TO THE CONCRETE BASE WITH A MINIMUM OF 4 x M12 'DYNABOLTS' OR EQUIVALENT.



A	ORIGINAL ISSUE	G.P.C.	01/2011
ISSUE	AMENDMENT DETAILS	INITIALS	DATE
0	10	20	30
40	50	100	150
200	250		



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DESIGNER	<i>P. Phosse</i>	DATE 12.01.2011
DESIGN MANAGER	<i>P. Phosse</i>	DATE 12.01.2011
DRAWN	ENGINEERING & OPERATIONS DESIGN UNIT	
SCALE	1:10 [A3]	

PROJECT:	LANDSCAPING STANDARDS
PLAN TITLE:	IRRIGATION MANIFOLD ENCLOSURE

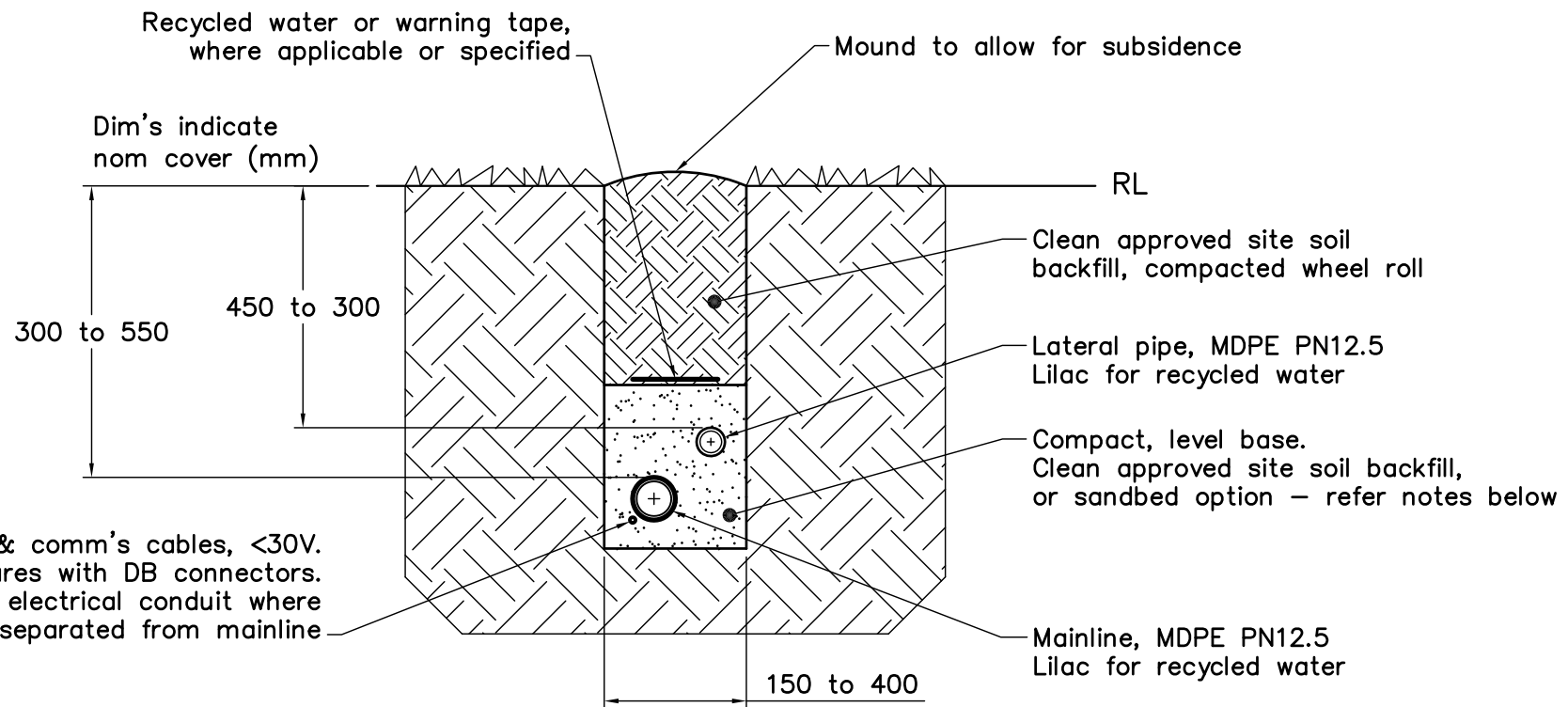
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DATE:	JAN. 2011



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**INSTALLATION NOTE:**  
 Tapping saddles may be used providing correct installation equipment & technique is used, incl:  
 1. Drill diameter is one size less than tapping size for low friction losses  
 2. Drill diameter is less than 50% of pipe diameter  
 3. Use specialized drill bit to expel swarth, and leave clean edges  
 4. Drill bit has a depth limiter to prevent overdrilling into pipe  
 5. Tapping angle is centered perpendicular to horizontal or vertical in trench, relative to intended take off point direction, no twists  
 6. The tapping is centered accurately over the hole and tightened evenly, no leaks



- NOTES:**
1. As a guide, min cover for mainlines up to 63mm is 300mm and for >63mm is 400mm
  2. For maximum pipe velocities & hydraulic friction loss limits refer specification and appendices
  3. For all fittings & connections refer specifications and appendices standard construction details
  4. Request site instruction from site project manager for any special excavation, such as; rock, sandbedding, trench shoring, turf cutting/reinstatement where not specified
  5. Snake cables loosely in trench & tape to underside of main @ 6m intervals. Allow expansion loops in cable at all bends & branches
  6. Maintain 25mm separation between pipes in common trenches, avoid crossovers
  7. Generally trench only what can be safely backfilled the same day
  8. Pressure test mainlines to 1000kPa for 30min to AS2566.2. Leave joints exposed for testing. ITP record to be signed by witness.
  9. Barricade any unfilled pits or trenches at end of each day, or during excavation as required to maintain site safety
  10. Flush all pipework to nearest low drainage point prior to sprinkler nozzle installation

**IRRIGATION PIPE TRENCH DETAIL**  
 NTS

DESIGN: SBJ  
 DRAWN: SBJ  
 CHECK: BMac  
 PAPER: A3  
 EMAIL: tsc@tweed.nsw.gov.au



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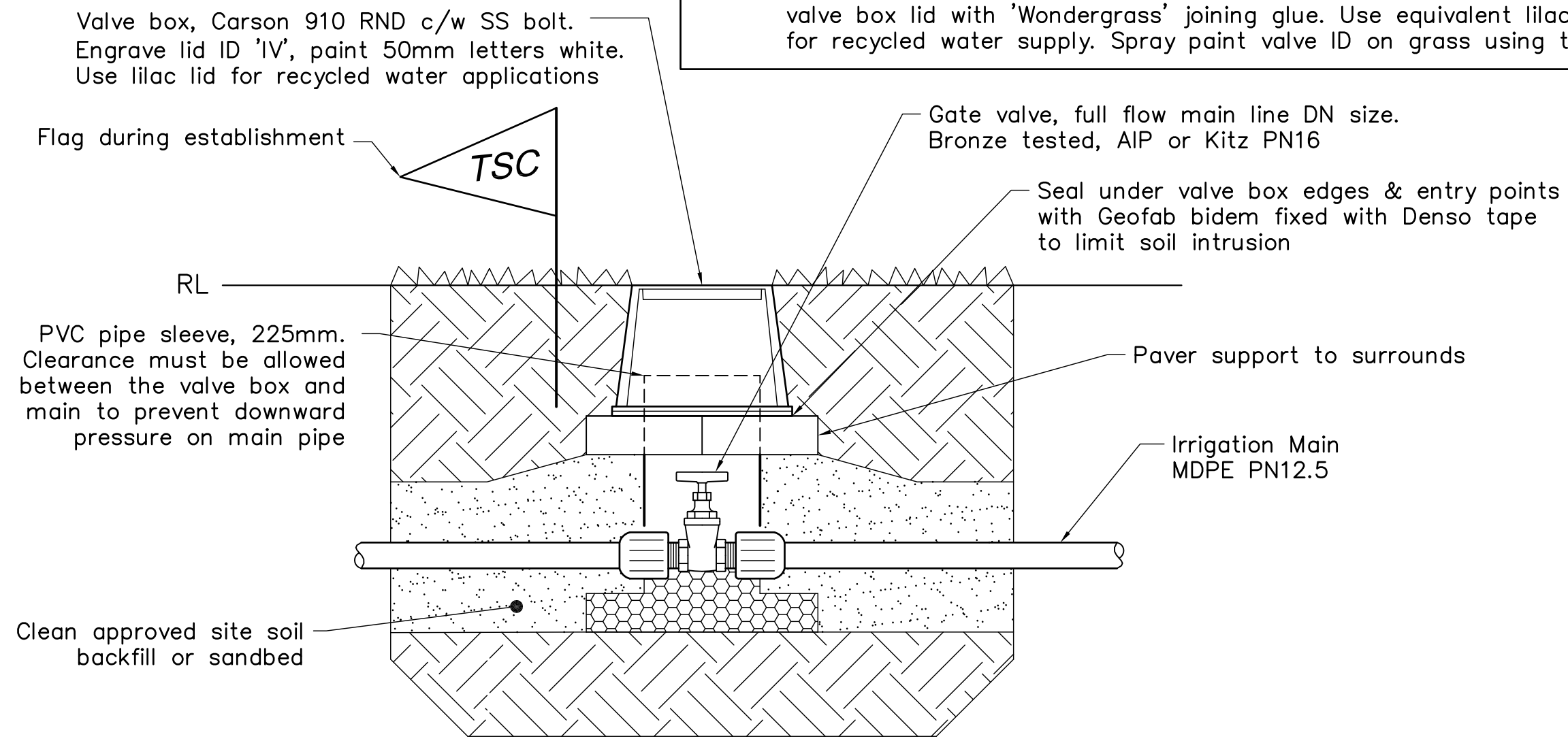
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 IRRIGATION ASSETS SPECIFICATION  
 STANDARD CONSTRUCTION DETAILS  
 IRRIGATION PIPE TRENCH DETAIL

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**VALVE BOXES IN SPORTS TURF APPLICATIONS:**  
 A. For valve box locations in sports turf projects;  
 A.1. Locate valve boxes min 4m from field boundaries where practical  
 A.2. Option, valve boxes close to field surface or within surrounds may require 'Wondergrass' sports grade synthetic turf to be neatly cut and bonded to valve box lid with 'Wondergrass' joining glue. Use equivalent lilac syn turf for recycled water supply. Spray paint valve ID on grass using template



Valve box, Carson 910 RND c/w SS bolt.  
 Engrave lid 'IV', paint 50mm letters white.  
 Use lilac lid for recycled water applications

Flag during establishment

Gate valve, full flow main line DN size.  
 Bronze tested, AIP or Kitz PN16

Seal under valve box edges & entry points  
 with Geofab bitem fixed with Denso tape  
 to limit soil intrusion

RL

PVC pipe sleeve, 225mm.  
 Clearance must be allowed  
 between the valve box and  
 main to prevent downward  
 pressure on main pipe

Paver support to surrounds

Irrigation Main  
 MDPE PN12.5

Clean approved site soil  
 backfill or sandbed

**NOTES:**

1. Use BSP type gate valves up to DN50 (63mm) main lines
2. Locate at mainline branches and intervals <200m along main to facilitate system service

**SMALL BORE ISOLATION VALVE DETAIL, BSP GATE TYPE**

NTS

DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	

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IRRIGATION ASSETS SPECIFICATION  
 STANDARD CONSTRUCTION DETAILS

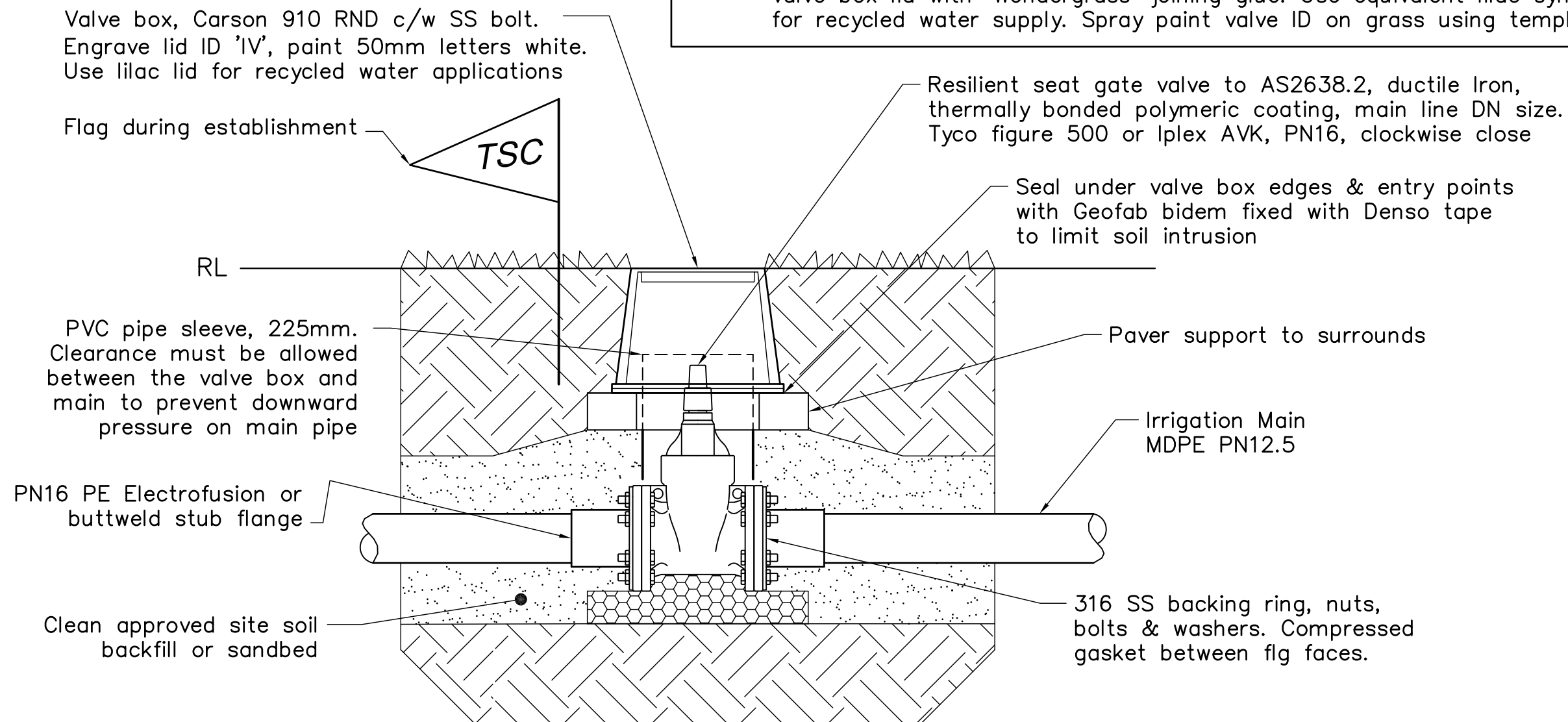
MAIN ISOLATION VALVE DETAILS – SMALL BORE BSP

DATE: 29 – 11 – 2010
DRAWING No: TSC-IA-SC-D4
Rv. 0

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**VALVE BOXES IN SPORTS TURF APPLICATIONS:**  
 A. For valve box locations in sports turf projects;  
 A.1. Locate valve boxes min 4m from field boundaries where practical  
 A.2. Option, valve boxes close to field surface or within surrounds may require 'Wondergrass' sports grade synthetic turf to be neatly cut and bonded to valve box lid with 'Wondergrass' joining glue. Use equivalent lilac syn turf for recycled water supply. Spray paint valve ID on grass using template



**NOTES:**

1. Use Resilient seat type gate valves for greater than DN50 (63mm) main lines
2. Locate at mainline branches and intervals <200m along main to facilitate system service
3. For socket type gate valves in PVC RRJ applications; lag pipework, add 20mPa concrete thrust block with anchor bolts sized in accordance with manufacturers recommendations

**LARGE BORE ISOLATION VALVE DETAIL, FLG GATE TYPE**

NTS

DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	

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**ENGINEERING & OPERATIONS – RSU**

IRRIGATION ASSETS SPECIFICATION  
 STANDARD CONSTRUCTION DETAILS

MAIN ISOLATION VALVE DETAILS – LARGE BORE FLG

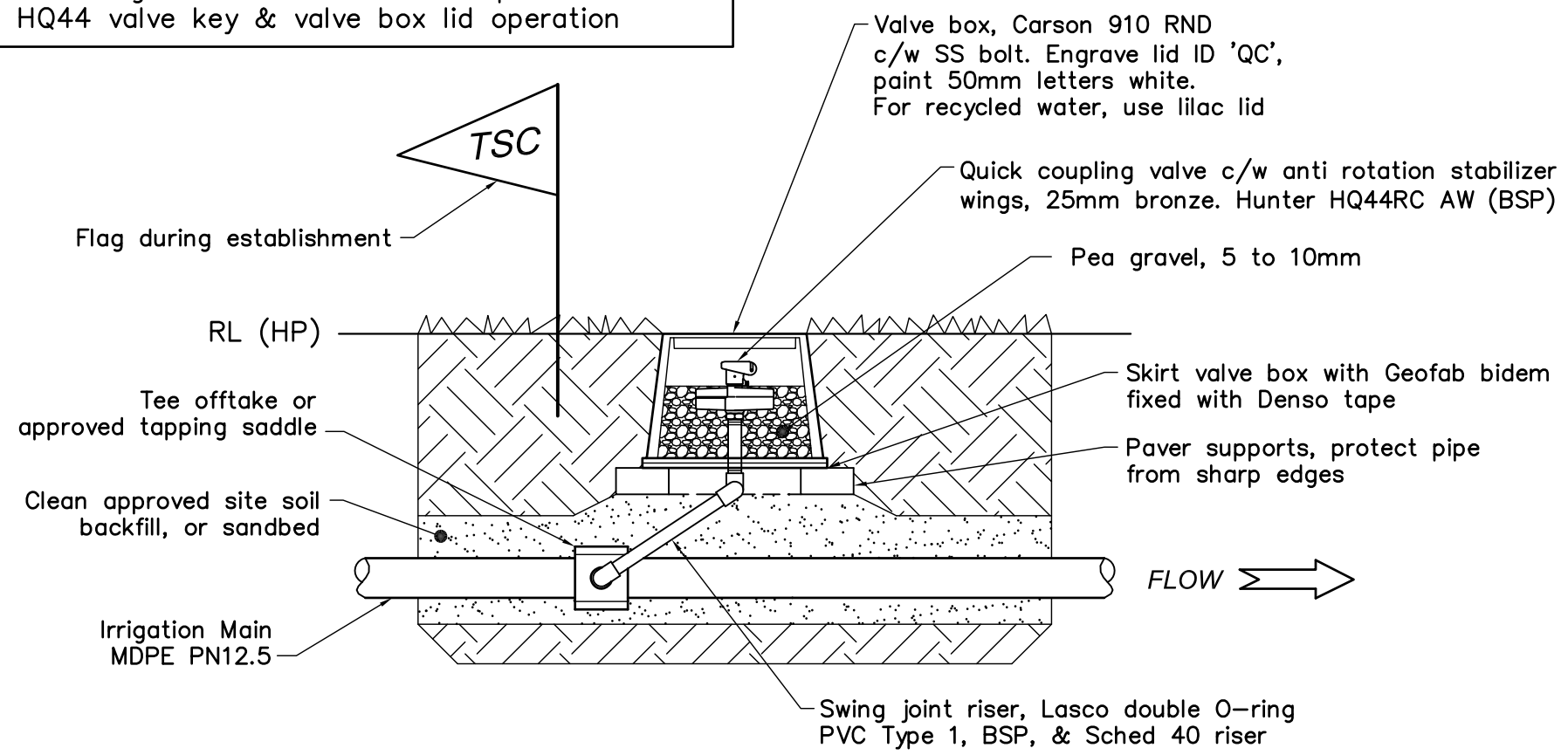
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Rv. 0

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**INSTALLATION NOTE:**  
Finished height of QCV to allow adequate clearance for HQ44 valve key & valve box lid operation

**VALVE BOXES IN SPORTS TURF APPLICATIONS:**  
A. For valve box locations in sports turf projects;  
A.1. Locate valve boxes min 4m from field boundaries where practical  
A.2. Option, valve boxes close to field surface or within surrounds may require 'Wondergrass' sports grade synthetic turf to be neatly cut and bonded to valve box lid with 'Wondergrass' joining glue. Use equivalent lilac syn turf for recycled water supply. Spray paint valve ID on grass using template



- NOTES:**
1. Minimum for mains up to 200m total length, located at end/s of main to facilitate flushing/testing during commissioning & service
  2. Locate at 50m intervals, where manual or temporary establishment watering is required
  3. Locate immediately upstream of solenoid valves for all drip stations, to facilitate establishment watering

**QUICK COUPLING VALVE DETAIL**  
NTS

DESIGN: SBJ  
DRAWN: SBJ  
CHECK: BMac  
PAPER: A3  
EMAIL: tsc@tweed.nsw.gov.au



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**ENGINEERING & OPERATIONS – RSU**  
IRRIGATION ASSETS SPECIFICATION  
STANDARD CONSTRUCTION DETAILS  
QUICK COUPLING VALVE DETAIL

DATE: 29 – 11 – 2010  
DRAWING No:  
**TSC-IA-SC-D6**  
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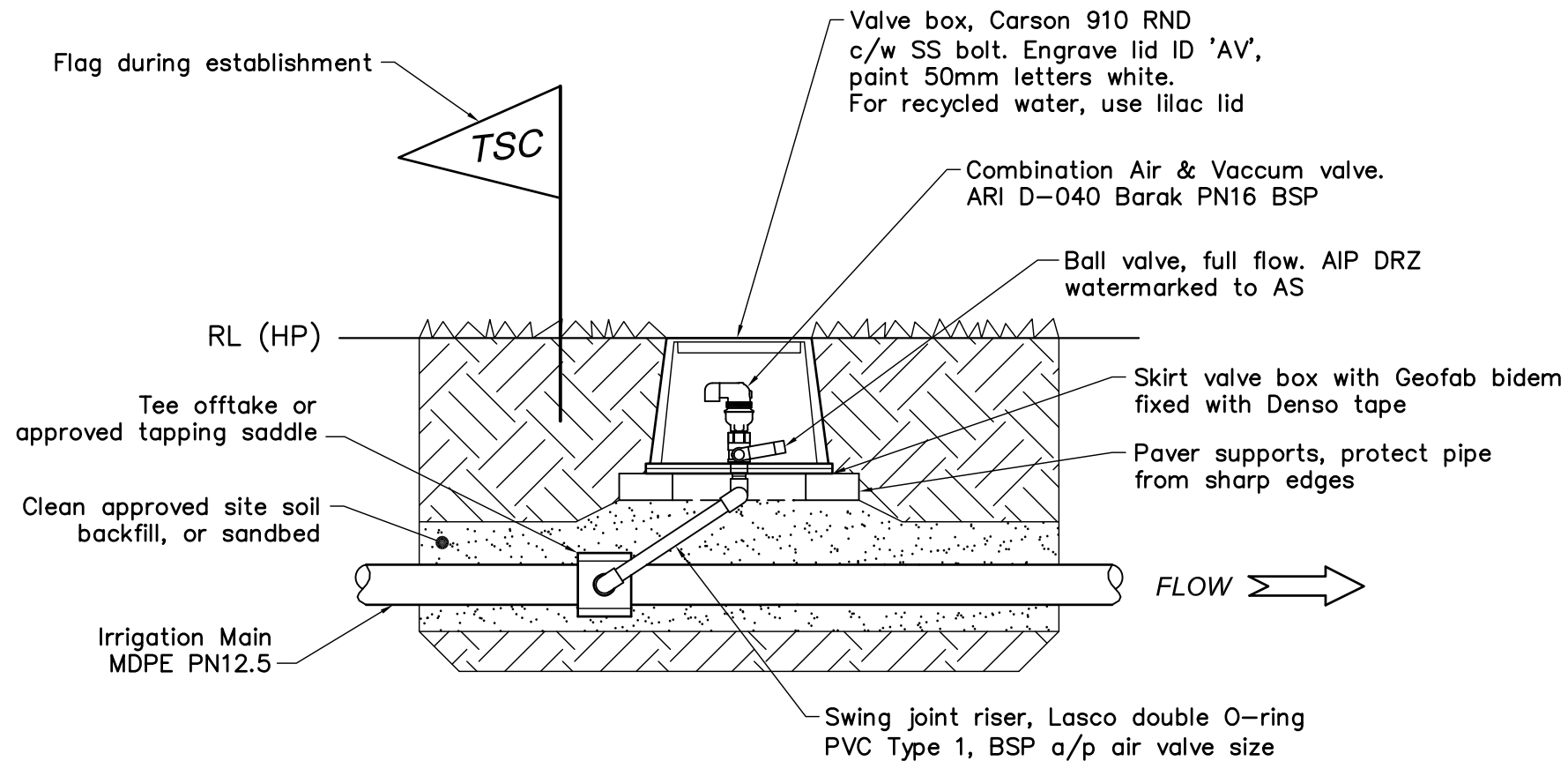


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**VALVE BOXES IN SPORTS TURF APPLICATIONS:**

- A. For valve box locations in sports turf projects;
  - A.1. Locate valve boxes min 4m from field boundaries where practical
  - A.2. Option, valve boxes close to field surface or within surrounds may require 'Wondergrass' sports grade synthetic turf to be neatly cut and bonded to valve box lid with 'Wondergrass' joining glue. Use equivalent lilac syn turf for recycled water supply. Spray paint valve ID on grass using template




**NOTES:**

1. Minimum 1x 25mm for up to 63mm mains up to 200m total length, located at high point/s or end/s of main on flat ground
2. Minimum 1x 50mm for >63mm mains up to 200m total length, located at high point/s or end/s of main on flat ground
3. For mainline >200m locate at 200m intervals at high points & immediately upstream of main isolation valves or end of line

**AIR VALVE DETAIL – MAINLINE**

NTS

DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	



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IRRIGATION ASSETS SPECIFICATION  
STANDARD CONSTRUCTION DETAILS

AIR VALVE DETAIL – MAINLINE

DATE: 29 – 11 – 2010

DRAWING No:

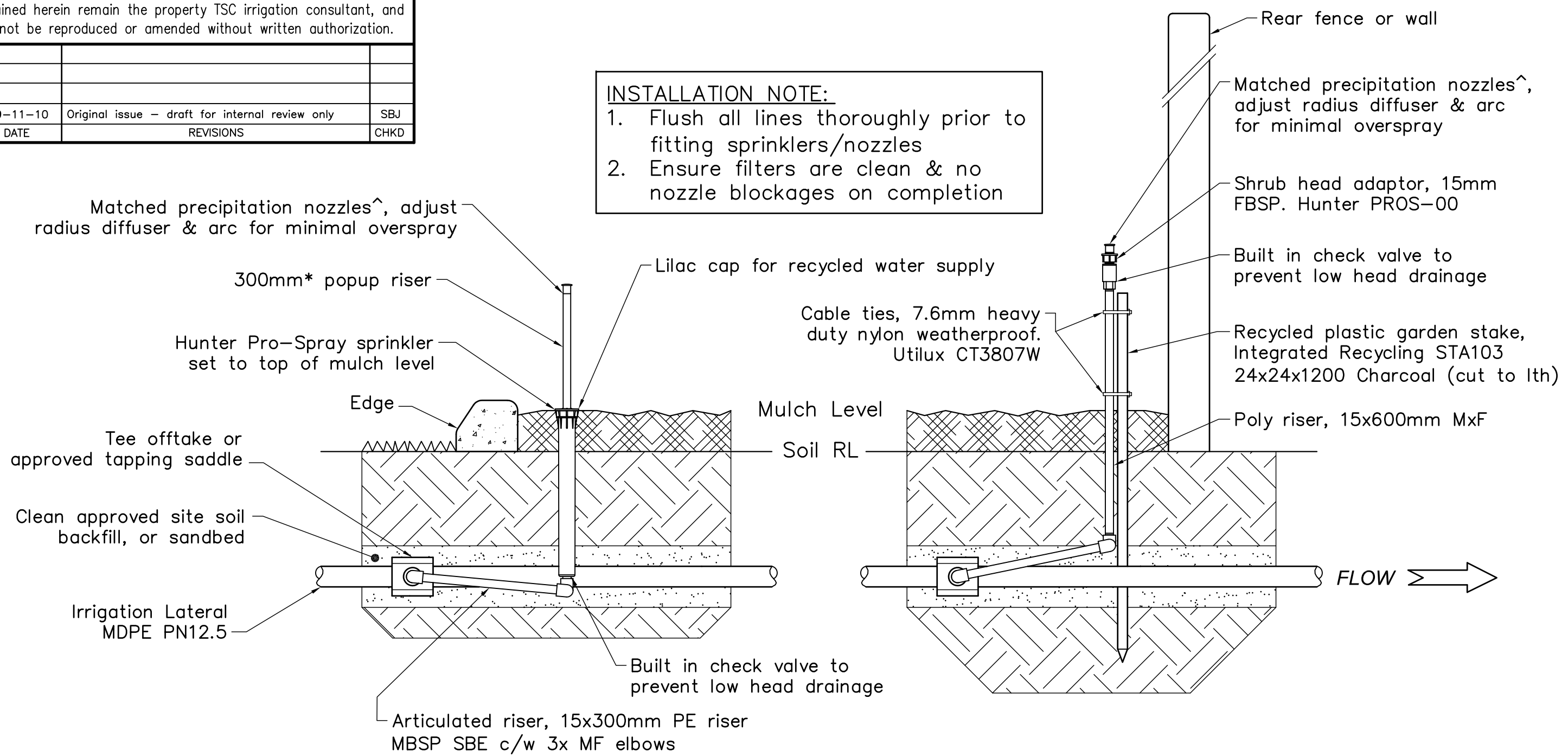
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**INSTALLATION NOTE:**  
 1. Flush all lines thoroughly prior to fitting sprinklers/nozzles  
 2. Ensure filters are clean & no nozzle blockages on completion



- NOTES:**
1. For sprinkler selection, spacing & performance criteria refer specification and appendices
  2. (^) Hunter MP rotator nozzles are required for majority of garden irrigation applications
  3. (\*) where subgrade/foundations limit excavation, 150mm riser is acceptable with PAS approval
  4. Popups must be used on all edges readily exposed to public visibility or assess
  5. Shrub heads may be used in centre or rear of garden beds where not readily exposed

**GARDEN POPUP SPRINKLER & SHRUB HEAD DETAILS**  
 NTS

DESIGN: SBJ  
 DRAWN: SBJ  
 CHECK: BMac  
 PAPER: A3  
 EMAIL: tsc@tweed.nsw.gov.au



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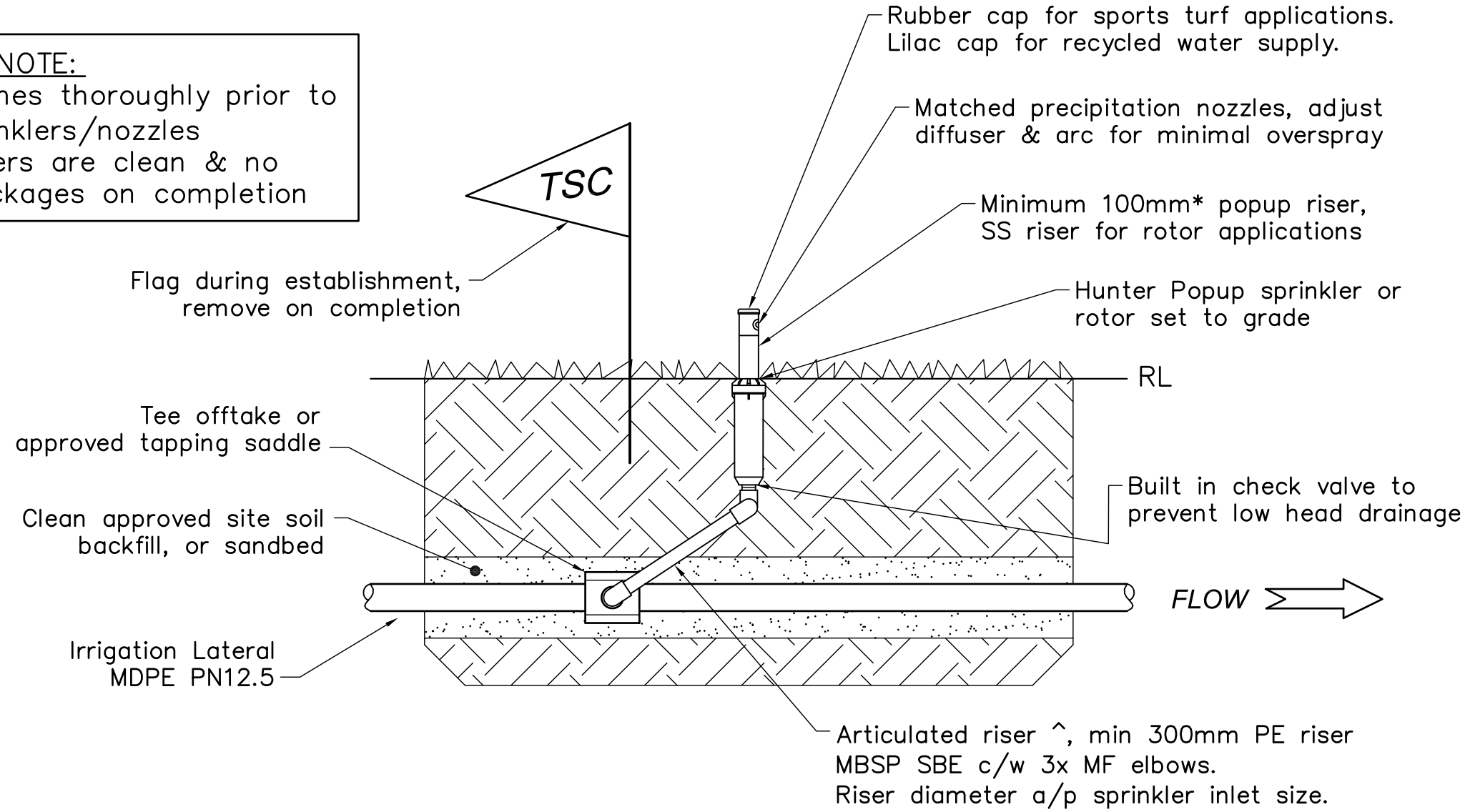
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 IRRIGATION ASSETS SPECIFICATION  
 STANDARD CONSTRUCTION DETAILS  
 GARDEN IRRIGATION SPRINKLER DETAIL

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**INSTALLATION NOTE:**  
 1. Flush all lines thoroughly prior to fitting sprinklers/nozzles  
 2. Ensure filters are clean & no nozzle blockages on completion



- NOTES:**
1. For sprinkler selection, spacing & performance criteria refer specification and appendices
  2. (\*) for low pressure 1-60 rotor applications, 80mm riser is acceptable
  3. (^) for valve in head applications, use double O-ring Lasco PVC swing joint riser

**TURF POPUP SPRINKLER OR ROTOR DETAIL**  
 NTS

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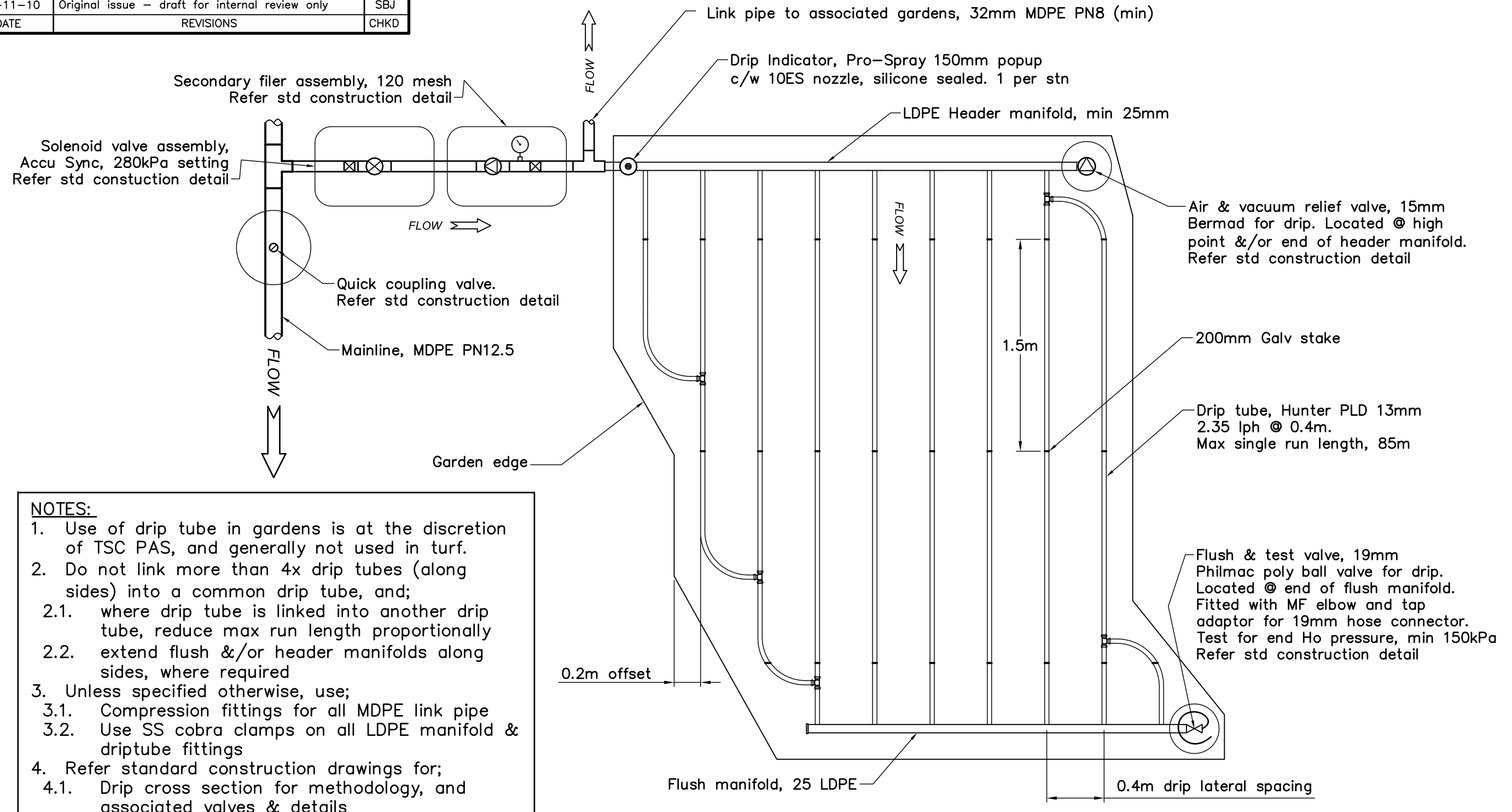
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 IRRIGATION ASSETS SPECIFICATION  
 STANDARD CONSTRUCTION DETAILS  
 TURF IRRIGATION SPRINKLER DETAIL

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- NOTES:**
1. Use of drip tube in gardens is at the discretion of TSC PAS, and generally not used in turf.
  2. Do not link more than 4x drip tubes (along sides) into a common drip tube, and;
    - 2.1. where drip tube is linked into another drip tube, reduce max run length proportionally
    - 2.2. extend flush &/or header manifolds along sides, where required
  3. Unless specified otherwise, use;
    - 3.1. Compression fittings for all MDPE link pipe
    - 3.2. Use SS cobra clamps on all LDPE manifold & driptube fittings
  4. Refer standard construction drawings for;
    - 4.1. Drip cross section for methodology, and associated valves & details

**DRIP TUBE GARDEN LAYOUT DETAIL**  
NTS

DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	

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IRRIGATION ASSETS SPECIFICATION  
STANDARD CONSTRUCTION DETAILS

DRIP IRRIGATION LAYOUT DETAIL

DATE: 29 – 11 – 2010	<p align="center"><b>TSC-IA-SC-F1</b></p>
DRAWING No:	
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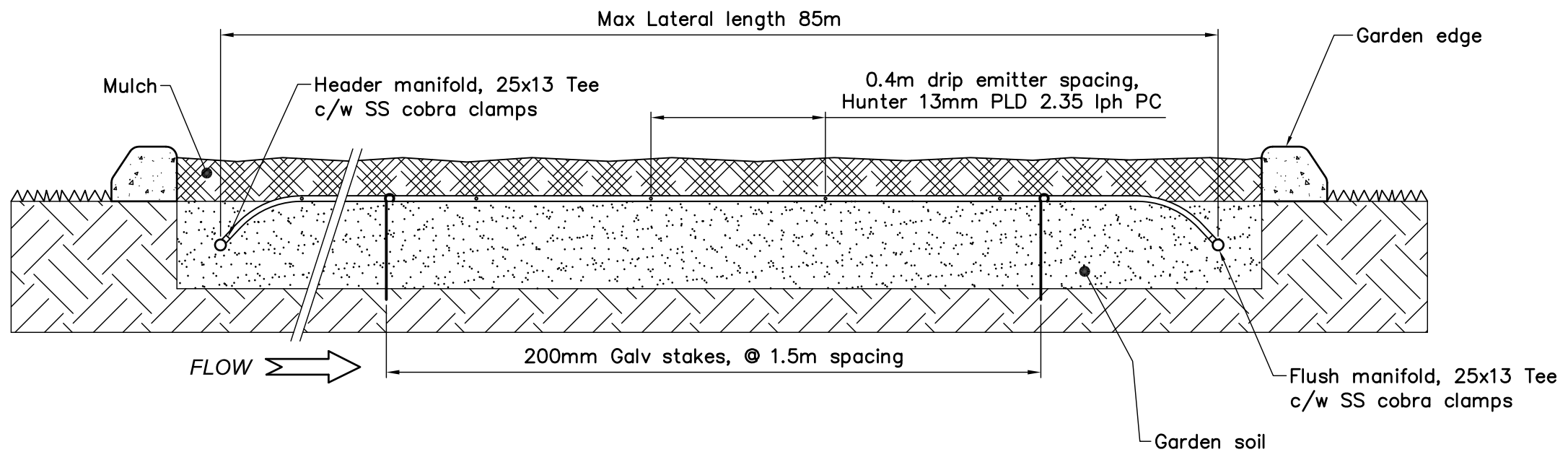
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**INSTALLATION METHODOLOGY:**

In general, the order of construction sequence shall be as follows;

1. Landscape contractor to achieve finished grade with garden soil. Manifold pipes may be installed during this process by irrigation contractor, if on site
2. Landscape contractor to plant all large trees & specimen plants, >25 litre bags
3. Irrigation contractor to install irrigation tube & stake. Flush & test at this stage where possible.
4. Landscape contractor to install minor planting & then mulch, taking reasonable care not to damage drip tube & pipework.
5. All damages must be flagged, reported & rectified same day.




**NOTES:**

1. Do not link more than 4x drip tubes (along sides) into a common drip tube, and;
  - 1.1. where drip tube is linked into another drip tube, reduce max run length proportionally
  - 1.2. extend flush &/or header manifolds along sides, where required
2. Unless specified otherwise, use;
  - 2.1. Compression fittings for all MDPE link pipe
  - 2.2. Use SS cobra clamps on all LDPE manifold & driptube fittings
3. Refer standard construction drawings for;
  - 3.1. Drip layout, secondary filter, drip air/flush valves and associated details

**DRIP TUBE GARDEN CROSS SECTION DETAIL**

NTS

DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	



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IRRIGATION ASSETS SPECIFICATION  
STANDARD CONSTRUCTION DETAILS

DRIP IRRIGATION CROSS SECTION GARDEN DETAIL

DATE: 29 – 11 – 2010

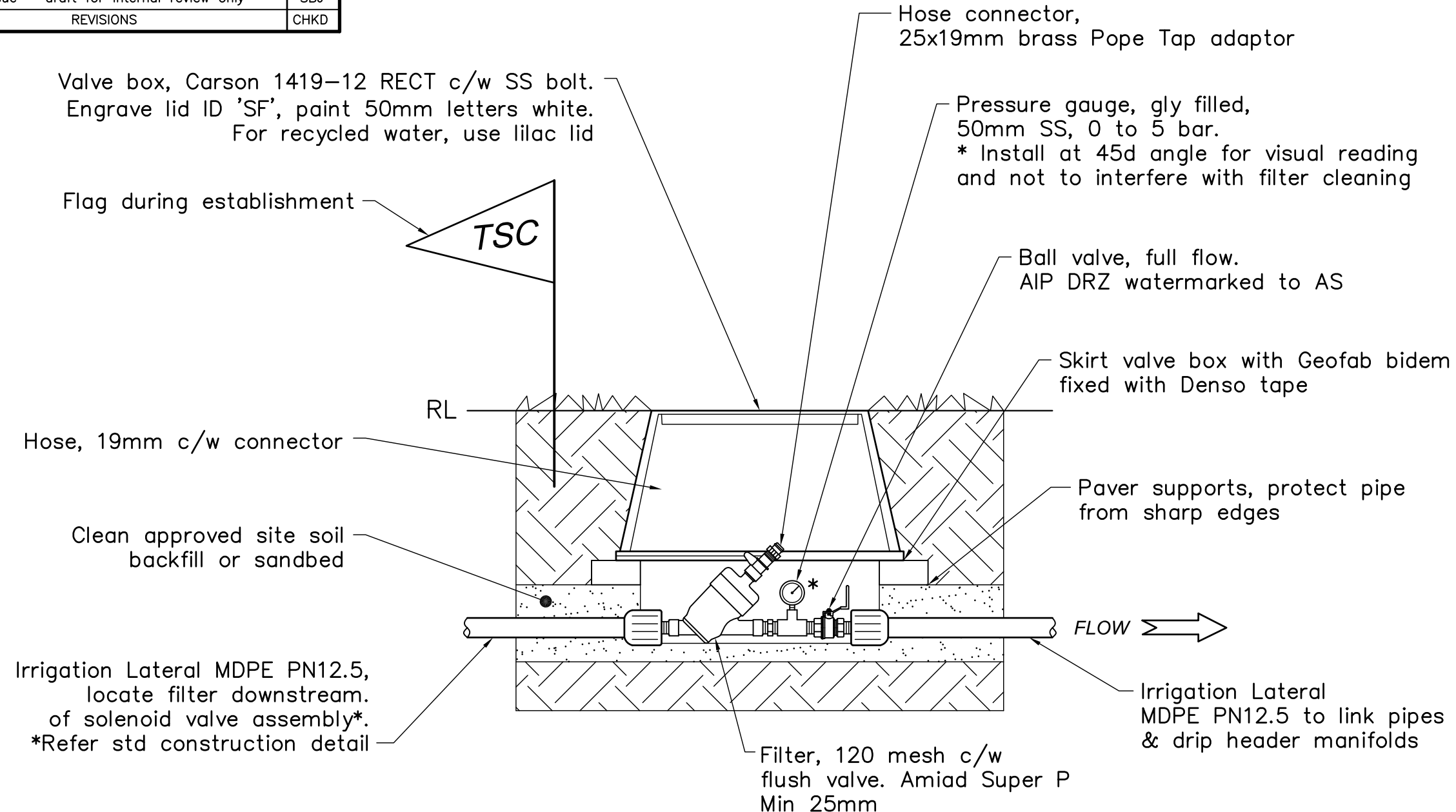
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**NOTES:**

1. Clean filter when outlet pressure >50kPa lower than inlet pressure regulator setting. Eg: for inlet AccuSync set at 280kPa, clean where filter outlet pressure <230kPa
2. Scrub filter element thoroughly during seasonal services

**SECONDARY FILTER DETAIL – DRIP STATION**  
NTS

DESIGN: SBJ	 <p><b>TWEED</b> SHIRE COUNCIL</p>
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	

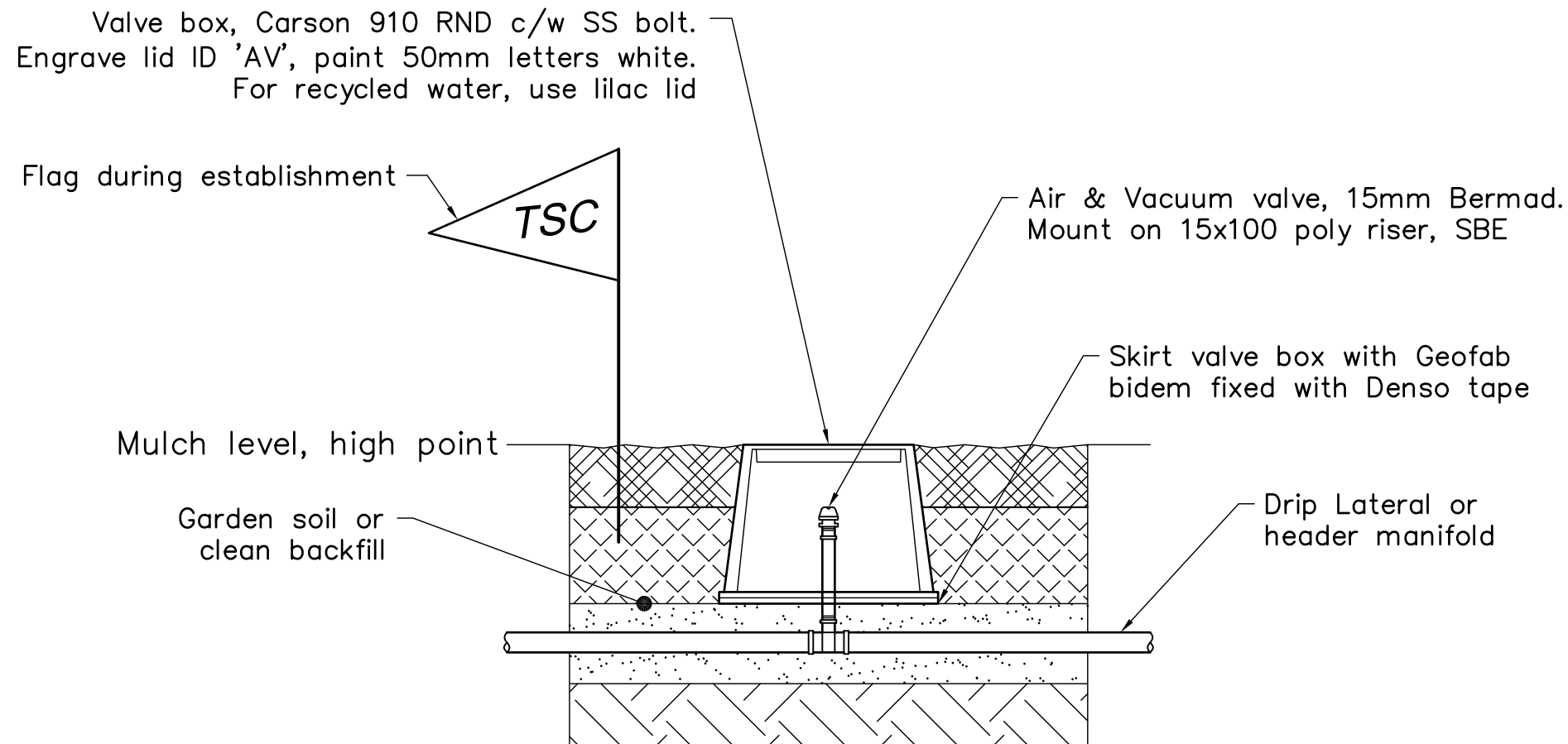
Civil & Civic Centre  
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**ENGINEERING & OPERATIONS – RSU**  
IRRIGATION ASSETS SPECIFICATION  
STANDARD CONSTRUCTION DETAILS  
DRIP FILTER ASSEMBLY DETAILS

DATE: 29 – 11 – 2010
DRAWING No: TSC-IA-SC-F3
0 Rv.

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**NOTES:**

1. Min 1 Air valve per drip station
2. Locate at high point on lateral or header manifold pipe.

**AIR & VACUUM RELIEF VALVE DETAIL – DRIP STATION**  
NTS

DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	



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**ENGINEERING & OPERATIONS – RSU**

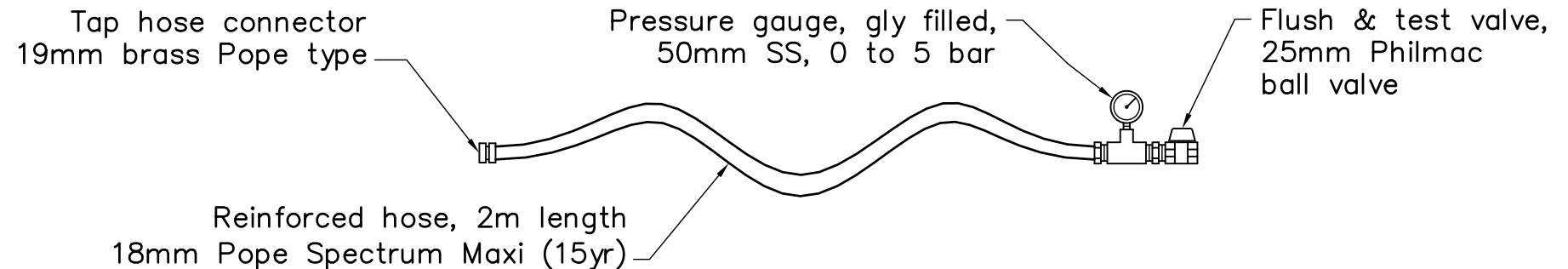
IRRIGATION ASSETS SPECIFICATION  
STANDARD CONSTRUCTION DETAILS

DRIP AIR & VACUUM RELIEF VALVE DETAILS

DATE:	29 – 11 – 2010
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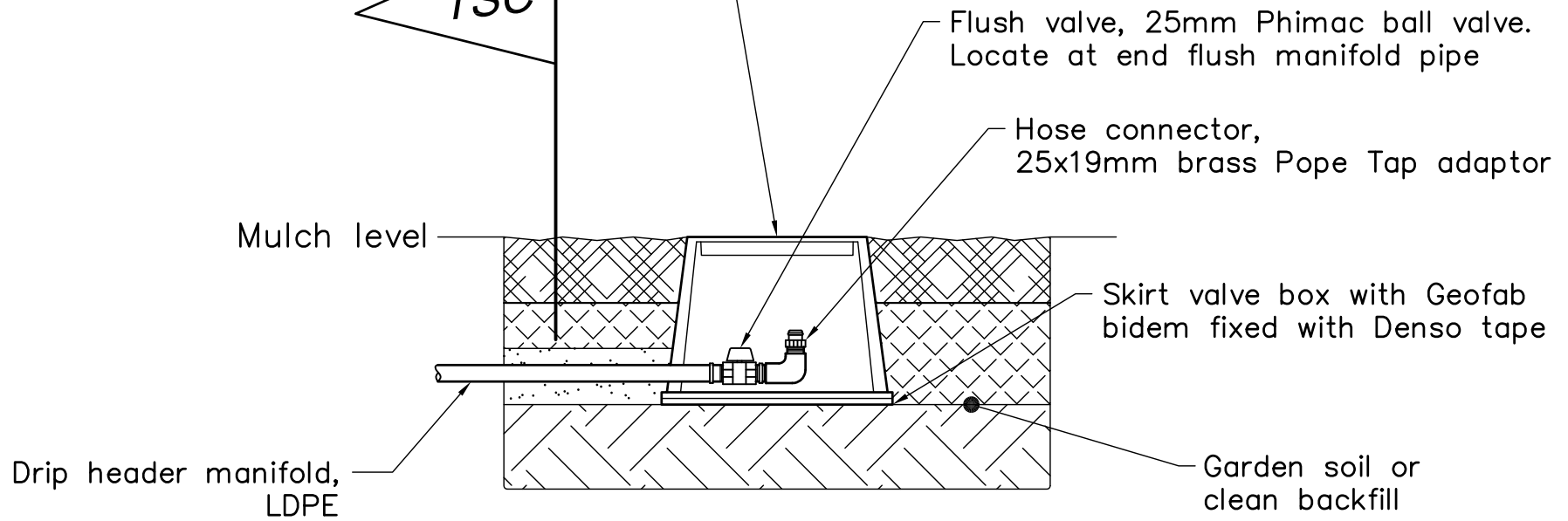
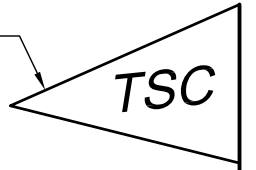
0	29-11-10	Original issue – draft for internal review only	SBJ
Rv.	DATE	REVISIONS	CHKD



**DRIP SERVICE HOSE KIT – FILTER, DRIP MANIFOLD FLUSH & PRESSURE TEST**

Valve box, Carson 910 RND c/w SS bolt.  
Engrave lid ID 'FV', paint 50mm letters white.  
For recycled water, use lilac lid

Flag during establishment



**NOTES:**

1. Min 1 flush valve at end of each lateral or drip manifold route
2. Supply 1x drip service hose kit per project
  - 2.1. Flush all drip manifolds thoroughly (~5min) at commissioning & seasonal services
3. Test end of line pressure for all drip stations.
  - 3.1. Minimum 100kPa at furthest & highest points from solenoid valve

**FLUSH VALVE DETAIL – DRIP STATION**  
NTS

DESIGN: SBJ	
DRAWN: SBJ	
CHECK: BMac	
PAPER: A3	
EMAIL: tsc@tweed.nsw.gov.au	

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**ENGINEERING & OPERATIONS – RSU**  
IRRIGATION ASSETS SPECIFICATION  
STANDARD CONSTRUCTION DETAILS  
DRIP FLUSH VALVE DETAILS

DATE:	29 – 11 – 2010
DRAWING No:	TSC-IA-SC-F5
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