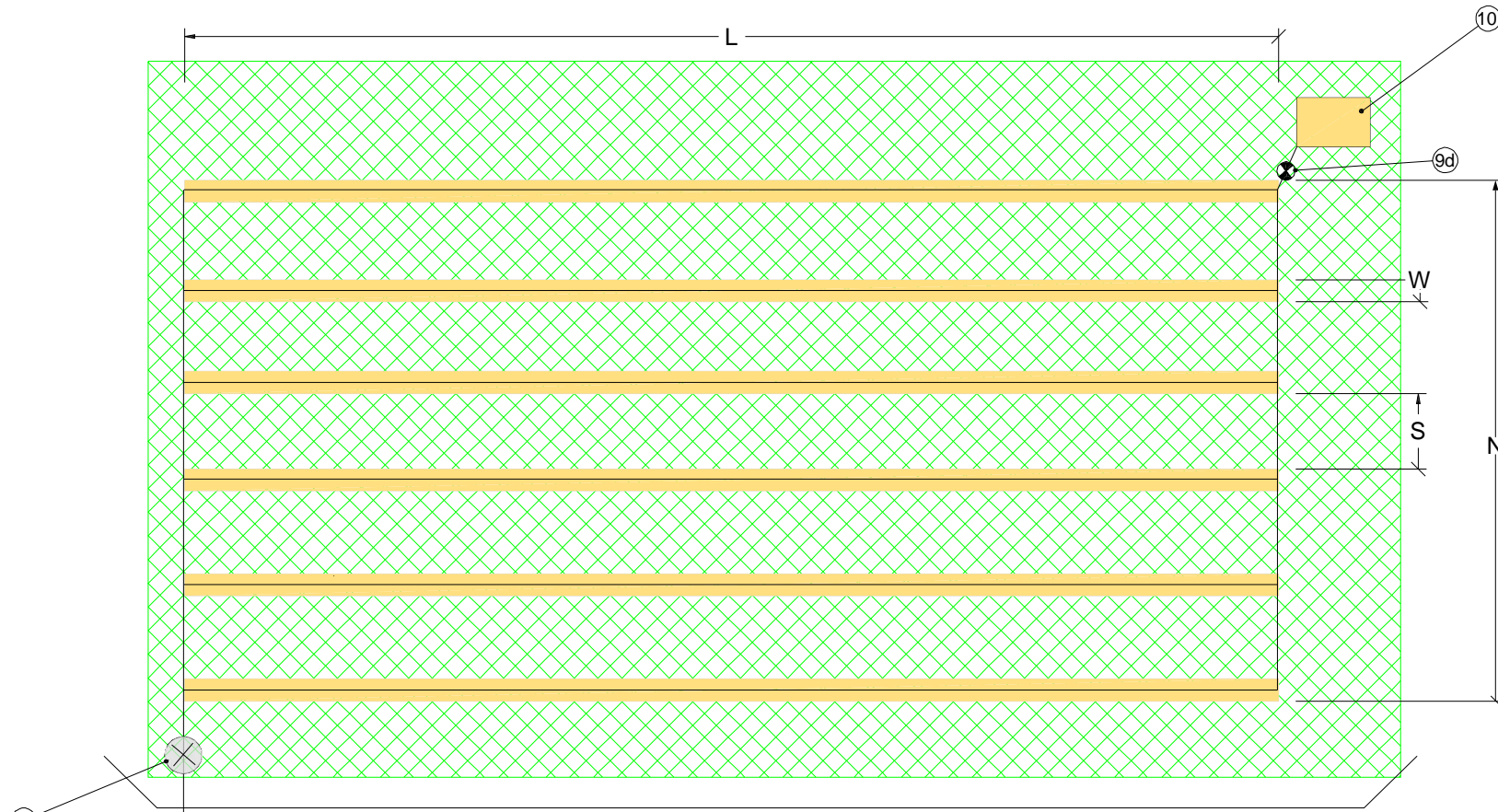


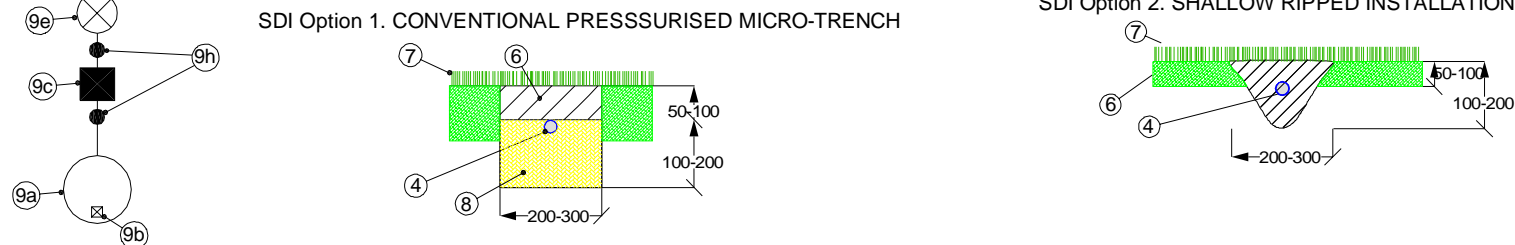
Sub-surface Drip Irrigation Field - PLAN VIEW



Sub-surface Drip Irrigation - Design and Installation Requirements

1. Approximate trench spacing (S) should be at least 1 m for conventional micro trenches and 0.5 m for the shallow ripped micro trench.
2. Trench length (L) and width (W) to be determined in accordance with specific hydraulic designs.
3. The total irrigation surface area ($A = L \times N$) should be sized according to Council requirements and AS/NZS 1547 (2000) for sustainable effluent re-use. Where laterals spacing greater than 1 m, calculate irrigation area as 300 mm each side of lateral. Fields shall be no greater than 500 m², laterals shall follow contours as much as possible.
4. Pressure compensating sub-surface drip irrigation pipes, minimum of 13 mm internal diameter, with dripper valves to be installed at 100-300 mm. Spacing should be less dense on highly permeable soils. "Non-drain" irrigation types preferred for sloping sites, mandatory for slopes greater than 15 %.
5. Principal effluent distribution line from 25 mm (minimum) manifold.
6. Existing or imported top-soil.
7. Grass or suitable (short, non-intrusively rooting) plants.
8. 10 - 20 mm distribution aggregate.
9. A site-specific detailed irrigation plan must be submitted and approved by council prior to construction. Provisions and details should be made for the following components, (a) pumps- selection based on site-specific flow and pressure requirements of the installation, (b) pump well – sized in accordance with NSW Health's "Septic Tank and Collection Well Accreditation Guideline" April, 1998, (c) in-line filter – 150-200 micron or in accordance with manufacturers details, (d) scouring or flushing valves – provision to flush the system to a trench or back to the head works, (e) automatic air release valve – to evacuate air and prevent pressurisation in pipe work, (f) vacuum release valve – to prevent a vacuum sucking soil/water in to pipe work and, (g) indexing or rotor valve – where irrigation of multiple fields is required. (h) 400 kpa glycerine filled pressure gauges either side of filter. There must be no more than 70 kpa loss through the filter before it is cleaned.
10. The effluent flushed out during the regular maintenance can be either flushed into a sub-surface pit (150 mm depth, 1 m² area/field, filled with 10-20 mm gravel at the bottom of each field, a combined pit at the bottom of all fields, or returned to the pump well at the top of the field provided that the pump is adequate to pump this head and volume.
11. The commissioning of the irrigation system should include a hydraulic test run to check for leaks and uneven distribution prior to backfilling.
12. The irrigation area should be delineated by signs. Signs should indicate "Sewage effluent pipe work is installed below. DO NOT DIG".
13. On completion of work a plan indicating the works as executed shall be provided to Council detailing any changes to the original design. Note that all alterations should be checked with Council prior to installation, and may in some cases require an amendment to the approval.

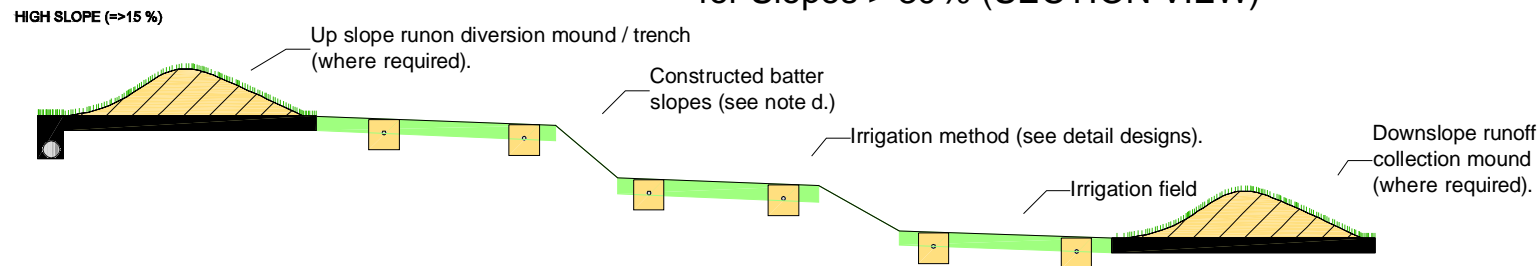
Installation Options - END VIEWS



Notes

- a. Irrigation design requires specialist knowledge, and should only be undertaken by people with adequate understanding and experience.
- b. Refer to Council Guidelines and Sheet 8 for additional design details, and to Sheet 5 where irrigation lines are to be installed inside micro-trenches.
- c. Micro-trenches may need to be used to provide adequate distribution of effluent on heavy clay soils or on very steep slopes.
- d. If terracing is required, geotechnical design input will be required to ensure that effluent and trenches will not destabilise batters.
- e. All pipe work and fitting shall be installed as per manufactures specifications and in compliance with AS2698 "Plastic Pipes and Fittings for Irrigation and Rural Application". Effluent grade pipe work shall be used if available on market.
- f. Subsurface irrigation field to be covered between 50-100 mm topsoil, then planted with grass or other suitable cover.
- g. Surface stormwater and sub-surface seepage shall be diverted from the irrigation area. Construction of upslope sub-surface swale and/or drain may be necessary in poorly drained sites. Downstream containment swale may be necessary if upstream of sensitive receptor or close to property boundary.

Profile of Terraced Irrigation Field for Slopes > 30% (SECTION VIEW)



Maintenance and Management

1. The system operator should maintain the irrigation area regularly, to ensure adequate cover of the pipe work, elimination of weeds maintenance and harvesting of plants and shrubs.
2. A three monthly service is to be carried out by a service contractor authorised by Council to service the irrigation system. This should include: (1) a clean out of the filter, (2) system flush, (3) a check and clean of the vacuum breaker (if installed), (3) visual check and clean of air valve, (4) visual check and clean of indexing or rotor valve, (5) check for root intrusion or other forms of damage to irrigation filed, and (6) visual check of the electrical system (refer problems to electrician).
3. A service report shall be prepared and a copy should be forwarded to council after each service.
4. Owners/operators should maintain servicing and inspection records.

Final Draft

CLIENT/ PROJECT North Coast Councils	TITLE Example Design Sub-surface Drip Irrigation Field	DESIGNED: DM	DATUM: na	SHEET 7 OF 10 SHEETS	REV.	DESCRIPTION	DATE	ISSUED
	PROJECT MANAGER:	PROJECT REFERENCE / DRAWING NUMBER:	DRAWN: DM		HORIZONTAL RATIO: na	1.0	Sub-surface irrigation design guide	11/11/2008
All measurements in mm unless otherwise specified.					2.0	Sub-surface irrigation design guide	25/03/2004	DM
					3.0	Example Designs	02/05/2005	PDD