**PRACTICAL ENGINEERING CONSULTANTS**

**ABN 67 57 931 069**

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| *Structural* | Buildings Bridges Towers Equipment |
| *Civil* | Roads Drainage Water Supply Sewerage Subdivisions |
| *Geotechnical* | Site Assessment Soil Testing and Stability |
| *Environmental* | Contamination Erosion Water Management Water Quality |
| *Construction* | Project Managers Inspections Supervision Plans |

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**ICG CONSTRUCTION GROUP**

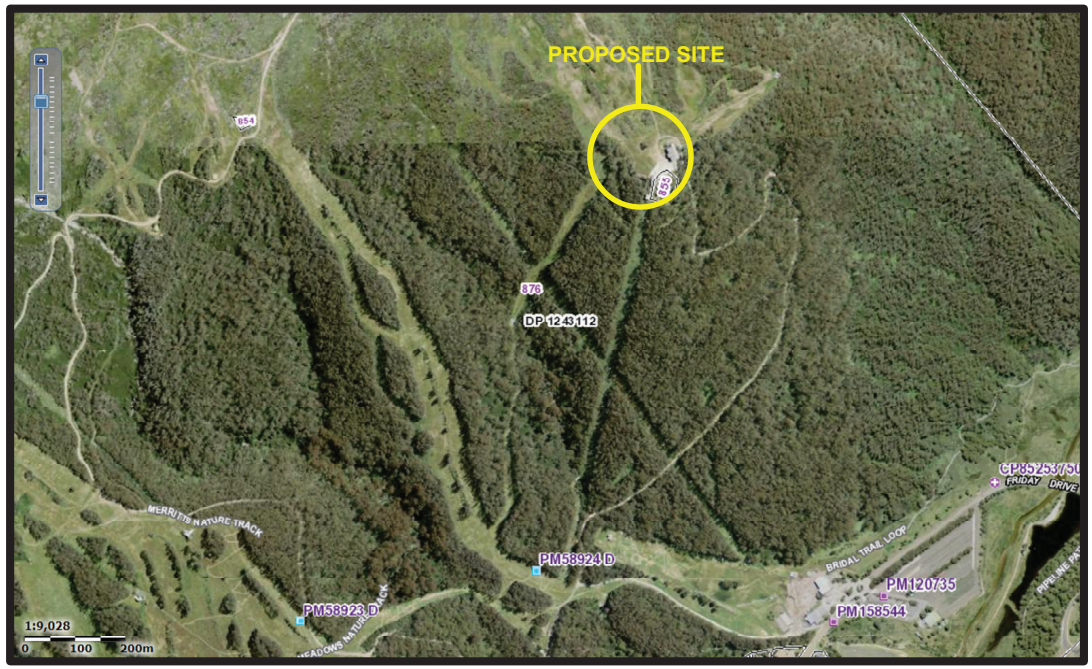
| DRAWING LIST | TITLE | REVISION |
|---|---|---|
| SHEET 1 | TITLE SHEET | D |
| SHEET 2 | CIVIL WORKS SPECIFICATIONS | D |
| SHEET 3 | SITE PLAN | D |

WORKS AS EXECUTED ISSUE 3 13/9/2024

# CIVIL ENGINEERING WORKS
# WORKS AS EXECUTED PLANS & ELEVATIONS

CLIENT : ICG CONSTRUCTION GROUP

LOCATION : MERRITTS MOUNTAIN PUMP HOUSE & TANKS
THREDBO NSW




**DESIGNED & CHECKED BY**

**Ovi Boaru**
**CPEng NPER Civil & Structural**
**DATE : 13th SEPTEMBER 2024**

**WORKS AS EXECUTED ISSUE**

**SITE SPECIFIC BRIDGE DESIGN AND DRAWINGS NOTES**

- Site Specific design and drawings includes following items ;
A) foundations (site specific geotech information has been extracted from geotech report & site visual inspections)
B) geometry (information shown has been taken from site survey and on site measurements)
C) hydraulics (no information has been provided – calculations undertaken)

**CONSTRUCTION HOLD POINTS**

A) Foundation Excavation (to check foundation base) to structures and pavements
B) Pre-concrete pour reinforcement to Pavements, Drains, Piers, Piles, Abutments, Headstocks, Retaining Walls, Wingwalls, slabs (where applicable)
C) All structural backfilling, Road or building pad construction (compaction & CBR tests per AS3798 earthworks code)
D) Final (completion and certification) includes scour protection, guardrails, etc

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**GENERAL NOTES**

1. All Dimensions on these plans should be checked on site by the builder and verified using architectural plans and other contract documents. Discrepancies should be referred to the Architect or the Engineer.
2. It is not implied or guaranteed that all structural designs and details shown in these plans are complete. The scope of work has been determined by the engineer based on the information supplied by the client or the clients consultants. Further designs may be required.
3. Do not Scale from these plans
4. Design loads in accordance with AS 1170 and AS5100-2017 Bridge Design Code
5. Roadways W80/A160/S1600/M1600 vehicular loadings

**DESIGN LOADING & CONSTRUCTION NOTES**

1 – Generally all loadings as per AS1170.0, AS1170.1 , AS1170.2 , AS1170.3 and AS1170.4
2 – Bridge loadings as per AS5100.2
3 – Barrier performance is low as per AS5100.2-2017
4 – Earthquake loading Design Category = BEDC-1 (EQ analyses not req'd)
5 – WindLoading as per AS5100.2-2017 section 17
Wind Region=A3, Terrain Category=2, Average Recurrence Interval (1:2000 for ULS), Average Recurrence Interval (1:20 for SLS permanent effects only), Design Windspeed = 41m/s in conjunction with Traffic loads (see previous)
Net Pressure Coefficient as per APP D2 of AS1170
6 – Drainage Design Data (as relates to site)

| AEP | Catchment Area | Flow Q(m3/s) | Vel(m/s) | |
|---|---|---|---|---|
| 1:10 | 0.71 hectares | 0.15m3/s | 3.7 m/s from pipe | - |

**EXCAVATIONS FOR EXTERNAL CONSTRUCTIONS**

-excavate and/or fill as required for external area slabs and footings
consolidate ground under all paths, pads or paved areas.

**EXISTING FOOTINGS**

Maintain support to existing footings as required to ensure integrity of existing buildings.

**CERTIFICATE**

Provide a practising civil or structural Engineer's Certificate for bearing pressure of foundation material.

**SOIL AND WATER MANAGEMENT**

Ensure that soils from the site are not transported beyond the boundaries. Site clearing and soil retention measures must comply with the Act. Refer to PRELIMINARIES: Environmental Protection – Soil and Water Management

**GROUND WORKS**

**Benchmark**

Relate all levels to the survey benchmark

**Foundation Test Pits/Bore logs**

Where foundation test pits/bore logs have been carried out
- re-excavate pits found under footings, slabs or pavements or within the "zone of influence"
- angle of zone of influence below horizontal:
- $30^0$ for sand foundation material
- $45^0$ for clay foundation material
- replace the backfill material in compacted layers. (SEE COMPACTION)

**SUPERVISION AND TESTING**

Arrange for the site filling and compacting to be supervised by a qualified geotechnical engineer: .
-tests to be undertaken by a NATA registered laboratory
-provide 2 copies of test results to the Superintendent.

**rejection:**

-if compacting is not up to the standard specified: carry out further compacting uniformly over the whole area until the specified standard is achieved and provide a further series of tests.
-Provide certificate from practising soil laboratory or engineer for compaction of fill.

**SITE CLEARING**

**GENERAL**

- clear and remove all stumps & other impediments and retain good ground cover where possible
- remove old pavings, footings, rubbish and debris from the whole of the site

**noxious plants :**

- eradicate from whole of the site blackberries, onion &oxalis weeds, nut grass & any other plant classified by Pastures Protection Board for the area as a "Proclaimed Noxious Plant or Weed"
- remove by grubbing out roots and/or by poison spray if such treatment is approved as effective

**removal of trees and stumps:** remove trees only as noted on the drawings and grub all stumps including those of trees previously removed

**TOPSOIL, STORAGE AND REMOVAL**

- remove topsoil from those areas of the site to be built upon and/or excavated including buildings, carparks, driveways, driving areas, paving and stockpile on site ready for re-spreading. Protect stockpile from contamination
- remove 100mm minimum depth of the surface layer of the natural ground
- remove from site and replace any contaminated topsoil. Refer to PRELIMINARIES:

**Environmental Protection Disposal of Contaminants and Refuse :**

- remove surplus excavated material on completion

**SITE EXCAVATIONS**

**GENERAL**

Excavate in material "as found". No variation to the contract will be allowed with respect to the type of material excavated
- backfill excavations taken below contract depth with concrete of equivalent strength to work immediately above at no variation to the contract
- remove surplus excavated material from the site
- provide a minimum clearance of 400mm to the underside of timber floor structures

**rock excavation :** where rock or shale is encountered scabble surface to level and solid bearing. Remove loose boulders and treat holes as above in backfilling

**trenches :** provide and maintain all necessary planking and strutting to excavations in sand or any other loose formation:
- where bearing capacity is affected by the removal of tree stumps, fence posts, rock floaters, etc. , excavate to solid bearing and backfill with concrete.

**SERVICE TRENCHES**

Excavate trenches to required depths to allow regulation cover over service lines:
- maintain sides of excavations vertical
- generally maintain straight runs between access holes, inspection points, and the like
- grade bottoms of trenches to provide uniform bearing. Dig bell holes after grading trench bottom
- keep trench base free of objects greater than 75mm
- keep main runs 600mm minimum clear of footings and concrete paths.

**sewer and stormwater drainage:**

Refer to PLUMBING AND SANITARY PLUMBING and DRAINAGE.

**underground electrical mains:** Refer to ELECTRICAL WORKS.

**underground water mains and gas lines:** Refer to DRAINAGE and GAS SERVICE.**FILLING MATERIALS**

**GENERAL**

Provide filling free from organic matter, from soil recovered from the site excavations or imported onto the site from an approved source. Filling must be in accordance with Engineer's drawings.

**FILLING TYPES**

**hardcore fill:** Fill with hardcore, made up of broken brick or stone, not larger than 75mm gauge.

**crushed rock fill:** Fill with crushed igneous rock, not larger than 40mm gauge with a minimum clay content.

**granular fill:** Fill with loose granular fill with minimum clay content.

**SITE PREPARATION AND BULK FILLING**

**AREAS UNDER CONSTRUCTION WORKS**

Where cut and fill is required under the building areas, carparks, driveways and pavings:
-carry out filling in accordance with Engineer's drawings
-grade area to solid and undisturbed bearing before filling
-fill in layers not exceeding 200mm loose thickness and each layer compacted.

**AREAS OTHER THAN THOSE UNDER CONSTRUCTION WORKS**

Filling is to be clean sandy loam fill taken from site excavations, and clean imported fill.

**imported fill:**

-is to be a friable, sandy loam
-comprise not less than 65% sand and not more than 15% silt and clay
-to have a pH between 5.5 to 6.5.

**GRADES AND FALLS**

Carry out grading and filling of site to finished levels on drawings:
-grade site to fall from buildings & paths, having a fall of 1:100 at least one metre from building
-maximum slope for grassed areas is 1:4 (25%) and mowable.

**backfilling:** backfill as required and consolidate to level of surrounding area.

**batters:** cut and fill as required to banks and retaining walls to form batter.

**FINISHED TOPSOIL AREAS**

Fill in with approved topsoil. Refer to LANDSCAPE WORKS -Materials.

**FINISH LEVELS**

Grade site so that grassed and planting areas finish flush with paths and paving, or as detailed.

**COMPACTION**

**GENERAL**

-provide compaction to filled areas in accordance with Engineer's drawings
-under buildings, roads, carparks, driveways and paving and within zone of influence of footings (except for loose granular filling used as formwork) to 98% minimum dry density ratio
-In areas where excessive settlements create tripping hazards or result in the formation of differential levels (such as backfill around manholes, at back of kerbs and against other minor concrete structures (i.e., pits, headwalls, retaining walls, etc) or places where the extent of differential settlements justifies future maintenance by topping up backfill (sewer and drainage trenches), compact to 95% dry density ratio.
-over other areas including loose granular filling used as formwork to 85% minimum dry density ratio.

**BITUMINOUS PAVINGS**

Where bituminous pavings are required, all work must be carried out in accordance with an approved construction specification

**FOUNDATIONS**

1. If not otherwise specified footings design based on minimum allowable soil bearing pressure of 150KPa. See specific details in these plans where higher magnitude bearing pressures for certain structural elements are required.
2. The design only applies for ground and foundation levels as shown on the drawings
3. Backfill foundation walls so that the level of fill on one side of the wall is never more than 450 above the level on the other side except where detailed retaining walls are used

**CONCRETE**

1. All concrete work in accordance with AS 3600-2017 and all bridge/culvert construction work to be in accordance with AS5100-2017
2. Concrete to be formed as required by AS 3610 and compacted in accordance with AS 3600 and AS 3610 to achieve specified or relevant density durability and strength
3. All reinforcing fabric to be lapped one mesh panel minimum and reinforcement bars lapped 40 bar diameters U.N.O.
4. Provide concrete strengths below to relevant structural items

| | | | |
|---|---|---|---|
| Pad Footings | f'c = 40 MPa | Strip footings | f'c = 40 MPa |
| Ground Slab | f'c = 40 MPa | Slabs Beams and Columns | f'c = 40 MPa |
| Other Specify | B2 Exposure Classification use | f'c=50 MPa for bridge abutments and decks | |
| Maximum slump of | 75mm | Maximum aggregate size | 20mm |

5. Sizes of concrete elements do not include thickness of applied finishes
6. Do not make any construction joints, holes or chases in the concrete elements unless shown or approved by the Engineer
7. Do not place pipes or conduits within the concrete cover to reinforcement
8. Reinforcement notation

| | | |
|---|---|---|
| N = Grade 500 deformed bar to AS 4671 | T = Top of element | TM = Trench Mesh |
| R = Grade 250 plain round bar to AS 4671 | B = Bottom of element | EW = Each Way |
| SL = Grade 500 square mesh to AS 4671 | UNO = Unless Noted Otherwise | |
| CTS = Centres | C/S = Courses | |
| RL = Grade 500 rectangular mesh to AS 46 | L = Grade 500 trench mesh to AS 4671 | |

eg 8 N16 @ 200T = 8 deformed bars 16 diameter at 200 centres placed at top of element

9. Provide clear concrete cover to reinforcement as follows: UNO

| ELEMENT | INTERIOR | EXTERIOR | EXTERIOR(against ground) |
|---|---|---|---|
| Footings | NA | NA | 45mm |
| Columns, Pedestals | 30mm | 50mm | 45mm |
| Slabs, Walls | 30mm | 50mm | 45mm |
| Beams | 25mm | 50mm | 45mm |
| Block work | 20mm from appropriate outside face | | |

10. Recommend using maximum bar chair spacing of 60 diameters for supporting bars and 75 diameters for fabric
11. Provide laps only at locations shown unless otherwise approved by the Engineer. Min.Lap length=40db UNO
12. For rectangular fabrics place top fabric main wires uppermost and bottom fabric main wires lowermost in direction of arrows
13. Supply and lay fabric in flat sheets., overlap 1st and 2nd cross wires of each sheet by 30mm at laps
14. Do not weld reinforcement unless shown or approved by the Engineer
15. Reinforcement is shown diagrammatically and not necessarily in true position
16. All concrete shall be placed and cured in accordance with Section 19 AS 3600. Where curing compound is used it must be applied (A) onto slabs within 2 hrs of finishing operation and (B) onto walls and columns immediately after removal of framework

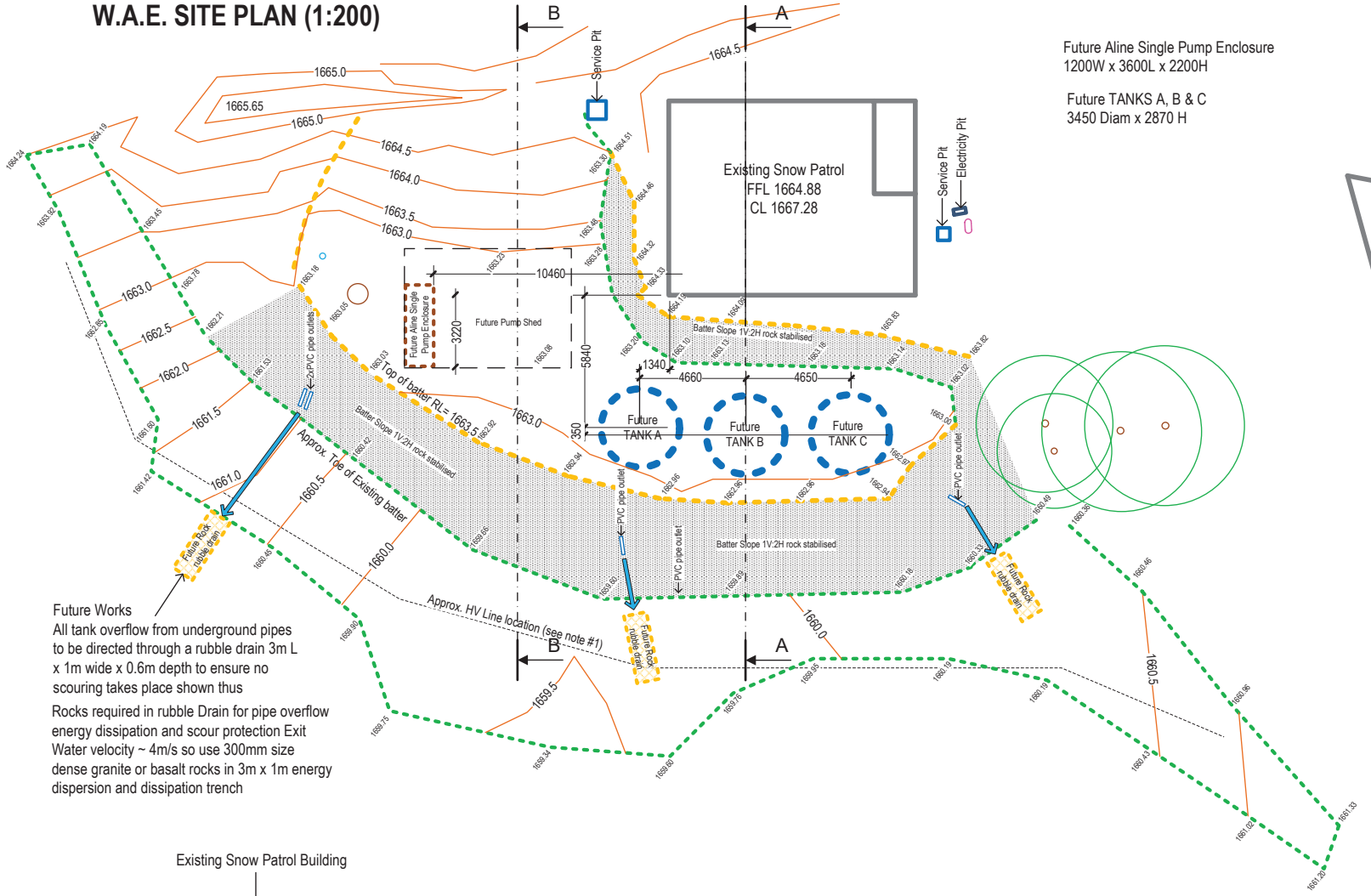
**DRAINAGE**

1. Cover Levels given are to be used as a guide only. Actual levels to be determined on site
2. All survey set out shall be undertaken by a qualified &appropriately experienced surveyor
3. The contractor shall not disturb any existing benchmarks
4. All existing and finished surface levels are to Australian Height Datum AHD UNO
5. Connection of new stormwater pipes to existing pipes and stormwater structures to be undertaken by the contractor
6. Where new work abuts existing work the contractor shall ensure that a smooth even profile free from abrupt changes is attained
7. All earthworks batters and trench lines in non paved areas are to be top soiled with 100mm site topsoil , dry land grassed and bitumen straw mulched
8. All reinforced concrete pipes shall be rubber ring jointed class 2 UNO
9. The contractor is required to liaise with affected lessees regarding any disruption to of vehicle access to their properties and to program the works in such a way as minimise the affects of disruptions however access for emergency vehicles should be maintained at all times
10. Sawcut through A.C. and Concrete surfaces where trenching is required
11. All abandoned stormwater, sewer and water supply pipes are to be sealed with 100mm minimum thickness concrete UNO
12. Allow for placement of heavy duty covers and seating rings for all structures in paved areas. Allow for standard covers and seating rings for all other structures UNO.

# WORKS AS EXECUTED PLANS & SECTIONS

Tanks, Pump enclosure and Rubble drains are shown as broken lines means that these works are intended as future works and are not located on site yet

## W.A.E. SITE PLAN (1:200)

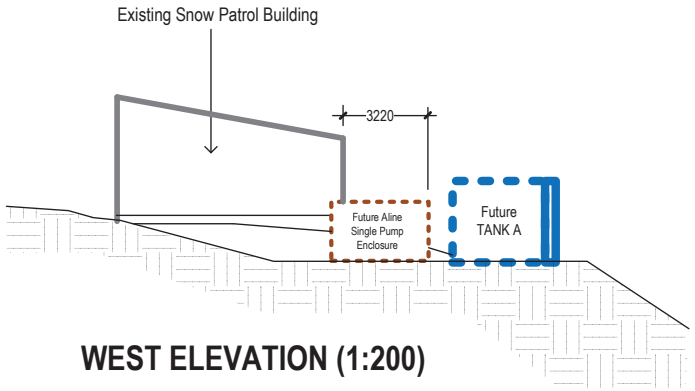



Future Aline Single Pump Enclosure
1200W x 3600L x 2200H

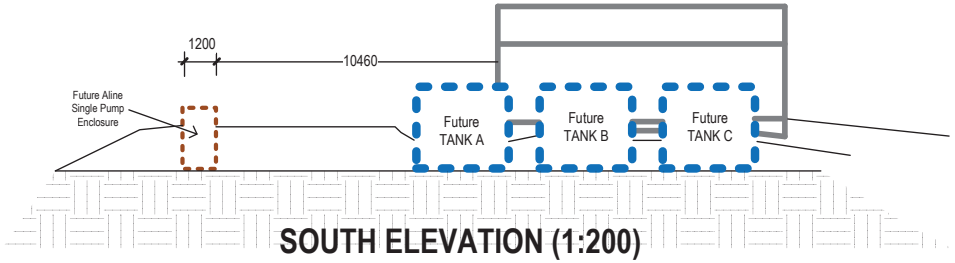
Future TANKS A, B & C
3450 Diam x 2870 H


Future Works
All tank overflow from underground pipes to be directed through a rubble drain 3m L x 1m wide x 0.6m depth to ensure no scouring takes place shown thus

Rocks required in rubble Drain for pipe overflow energy dissipation and scour protection Exit Water velocity ~ 4m/s so use 300mm size dense granite or basalt rocks in 3m x 1m energy dispersion and dissipation trench




## WEST ELEVATION (1:200)




## SOUTH ELEVATION (1:200)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ICG – WATER SUPPLY TANKS AND PUMP HOUSE - THREDBO | PRACTICAL ENGINEERING CONSULTANTS | Size: A3 | Rev: D | Scale: 1:200 | SHEET 3 |