**Inspection and test plan – Conduits and pits installation**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Project no.** | CC0375 | | **Project name** | Hunter Power Project | | | | | | **Date** |  |
| **Symal ITP no.** | | CC0375-ITP-008 | **Revision no.** | 5 | **Revision date** | 11/01/2023 | **Plant and equipment used** | |  | | |
| **UGL ITP no.** | | 3200-0663-HPP-QA-ITP-009 | | | | | **SHL ITP no.** | HPP-UGL-QUA-GN-GEN-ITP-0009 | | | |
| **Lot no.** | |  | **Location (chainages, detailed description or marked up plan)** | | | | |  | | | |

Attach Dockets, Certificates and QA Documents to ITP

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Contact Details | | | | | | | Summary of Requirements | | | | | Principle Codes / Standards | | | | | | Records | | | | | | |
| **Customer:**  **Construction Manager:**  **Project Engineer:**  **Quality Representative:**  Subcontractors    Surveillance / Inspection Key  **HOLD POINT (H):** Nominated point beyond which work shall not proceed without verified acceptance by nominee.  **WITNESS POINT (W):** Points at which the nominee shall be notified and invited to witness an activity, but further work may proceed without the presence of the nominee.  **SURVEILLANCE (S): Continuing** evaluation of the status of methods, analysis of records and monitoring of activities on a random basis to ensure quality requirements will be met.  **VISUAL (V): 100**% Visual Inspection of work / item to ensure compliance with code / specification.  **DIMENSIONAL (D): Measurement** of critical dimensions to ensure work / item is within tolerance | | | | | | | **Process Qualifications**  **Traceability:**  Material:  Alloy Verification  Heat Treatment:  Pressure Testing  Consumable:  NDT:  Welder ID:  WPS:  Electrical:  Instruments  **Heat Treatment:**  **Dimensional Control:**  **Testing (NDT):**  **Acceptance Specification:**  **Pressure Testing:**  **Elect. / Instrumentation:**  Notes: | | | | | **Client Specifications**  HPP-AEC-CIV-GN-GEN-SPT-0161\_0 QUALITY (CONSTRUCTION)  HPP-AEC-ELE-GN-GEN-SPT-0002\_0 GENERAL ELECTRICAL INSTALLATION  HPP-AEC-CIV-RO-ROD-SPT-1112\_A EARTHWORKS (ROADWAYS)  **Engineering Procedures / WI** | | | | | | **(MDR Insert as marked 3 )**   * Inspect Release Certs. * Deviations/Concessions * Material Certificates * Conformance Certificate * Welding Records * Welder Qual. Register * NDT Reports * Report on Repairs * Heat Treatment Records * Dimensional Records * Non-Conformance Rpts * Pressure Test Records * Drawings & Data Sheets * Misc Verification Records * Electrical Test Sheets | | | | | | |
| Prepared by: | | | | Steven Lee | | | | | Date: 11/01/23 | Approved By: Josh Fisicaro | | | | | Date: 11/01/23 | | | | |  | | | | |
|  | |  | | |  | |  | | |  | | **Verification of acceptance by** | | | | | | | | | **Remarks / record (eg. test frequency, reports, certificates, checklist etc)** | |
|  | |  | | |  | |  | | |  | | **Symal** | | | **UGL** | | | **SHL** | | |
| **Item no.** | | **Activity** | | | **Ref docs** | | **Acceptance criteria** | | | **Acceptance** | | **Key** | **Sign date** | | **Key** | **Sign date** | | **Key** | | **Sign date** |
| **1.0 Preliminaries** | | | | | | | | | | | | | | | | | | | | | | |
| **1.1** | | Documentation | | | Issued drawings / Site copy drawings | | Check that you have the latest site and engineering drawings BEFORE starting each task/set of tasks. | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **1.2** | | Lot Traceability | | |  | | Lots to be broken up accordingly and outlined on a lot map | | | Yes  No  N/A | | S |  | | S |  | | S | |  | Lot map | |
| **1.3** | | Underlying Lot Conformance | | | Underlying Lot ITP | | Underlying services and/or assets have been installed prior to commencing works over and/or above.  Refer underlying lot ITP(s) | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **1.4** | | Set Out | | | Drawings | | Peg location of proposed underground services with levels from pit to pit. Peg property boundaries | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **2.0 Material Conformance** | | | | | | | | | | | | | | | | | | | | | | |
| **2.1** | | Conduit Supply | | | Spec. 0002 General Electrical Installation [Cl 6.7] | | Conduit system shall be a Category A wiring enclosure for an underground wiring system to **AS/NZS3000** and **AS/NZS 3013**.  No corrugated conduit or similar shall be used under any circumstances.  **HV & LV Conduits:**  Shall be orange heavy-duty uPVC, sizes as per drawings otherwise min **150mm** **(HV)** and **100mm** **(LV)** to be used.  **Comms Conduits:**  Shall be white heavy-duty uPVC, sizes as per drawings otherwise min **100mm** to be used. | | | Yes  No N/A | | S |  | | S |  | | S | |  | Material certification | |
| **2.2** | | Pit Supply | | | Spec. 0002 General Electrical Installation [Cl 6.11] | | All pits are to be reinforced concrete complete with concrete lids. All lids shall be gatic with min load classification of Class D in accordance with **AS 3996.**  Pits lids shall be fixed to prevent unauthorised access. | | | Yes  No  N/A | | S |  | | S |  | | S | |  | Material certification | |
| **2.3** | | Embedment material | | | Spec. 0002 General Electrical Installation [Cl 6.6, 6.11] | | All conduits shall be surrounded by a min of 100mm compacted sand unless shown otherwise on the drawings. For power conduits, this compacted sand must have a min thermal rating of 1.2°C.m/W. | | | Yes  No  N/A | | S |  | | S |  | | S | |  | Material certifications | |
| **3.0 Excavation, Installation and Backfill - Conduits** | | | | | | | | | | | | | | | | | | | | | | |
| **3.1** | | Excavation | | | Spec. 0002 General Electrical Installation [Cl 6.6]  Drawings | | All trenches unless otherwise directed by Snowy Hydro shall be excavated as per Drawings. | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **3.2** | | Place Bedding | | | Spec. 0002 General Electrical Installation [Cl 6.6]  Drawings | | Pits shall be installed on a compacted sand base of not less than 100mm.  Bedding layer to be compacted for the full width of the trench to a depth of 100mm for Comms & 150mm for Power Conduits. | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **3.3** | | Conduit Installation | | | Spec. 0002 General Electrical Installation [Cl 6.11, Cl.17.1]  Drawings | | Conduits to be installed as per the drawings in a straight line where possible and with no changes in diameter between pits. Joints to be sealed with a solvent cement or glue as per manufacturer recommendations.  Minimum separation to be 150mm for DN150 conduits and 100mm for all other sizes unless shown otherwise on the drawings  Minimum depth of cover to conduits to be:   * 300mm for COMMS * 500mm for LV * 900mm for MV   **WITNESS POINT – Prior to Backfilling** | | | Yes  No  N/A | | **H** |  | | **W** |  | | **W** | |  |  | |
| **3.4** | | Conduit bends | | | Spec. 0002 General Electrical Installation [Cl 6.7] | | All conduit bends shall be long sweep bends with a maximum 90-degree angle.  Min bend radius shall suit the min cable bending radius of the largest cable in the conduit and generally not be less than 1000mm. | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **3.5** | | Marker tape | | | Spec. 0002 General Electrical Installation [Cl 6.9] | | Orange Polyethylene marker tapes, 150mm wide and 0.1mm deep, shall be laid in the trench directly over all underground conduits at approximately 50% of the depth of cover**.** The tape shall be marked with the warning:  **“WARNING BURIED POWER CABLES”**  or similar in black letters that will not fade. | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **3.6** | | Backfill - Conduits | | | Spec. 0002 General Electrical Installation [Cl 6.6] | | Backfill the full width of trench with compacted sand to above the level specified for compacted sand, back to natural surface level.  *Layers not to exceed* ***150mm*** *compacted thickness.* | | |  | | S |  | | S |  | | S | |  |  | |
| **3.7** | | Compaction | | | Spec. 0002 General Electrical Installation [Cl 6.6]  Spec. 1112 Earthworks (Roadways) [Cl 4.13, 7.1] | | Each layer to be compacted to a density that is no less than the density of the existing adjacent material. If the existing material density is unknown, minimum relative compaction to be:   * 95% for foundations * 70% for conduit encasement * 97% for select fill areas   - 92% for general fill areas | | | Yes  No  N/A | | S |  | | S |  | | S | |  | Test reports | |
| **3.8** | | Cable Markers | | | Spec. 0002 General Electrical Installation [Cl 6.10] | | Install Concrete Cable markers on the surface of all underground cable joints, at every change in direction, and on straight runs at least every 30m.  Markers to be a 400mm square and 100mm deep concrete block with a brass label attached. Label to identify conduit type and direction. | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **4.0 Excavation, Installation and Backfill - Pits** | | | | | | | | | | | | | | | | | | | | | | |
| **4.1** | | Excavation | | | Spec. 0002 General Electrical Installation [Cl 6.6]  Drawings | | All trenches unless otherwise directed by Snowy Hydro shall be excavated as per Drawings. | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **4.2** | | Place Bedding | | | Spec. 0002 General Electrical Installation [Cl 6.6]  Drawings | | Pits shall be installed on a compacted sand base of not less than 100mm.  Bedding layer to be compacted for the full width of the trench to a depth of 100mm for Comms & 150mm for Power Conduits. | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **4.3** | | Pit Installation | | | Drawings | | Pits to be installed as per drawings and manufacturers specifications.  All conduit entries are to be fitted with **proprietary bell-mouths** installed flush with the pit wall.  All pit joints and bell-mouths are to be mastic sealed or glued as per manufacturer recommendations.  **WITNESS POINT – Prior to Backfilling** | | | Yes  No  N/A | | **H** |  | | **W** |  | | **W** | |  |  | |
| **4.4** | | Pit Drainage | | | Drawings | | Pits to be installed with a drainage system as per the drawings to prevent pooling of water | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **4.5** | | Step Irons | | | Drawings | | Pits deeper than 600 to be fitted with galvanised plastic-coated step irons as per AS1657 | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **4.6** | | Access Covers | | | Drawings | | Pits to be fitted with Class D Concrete Infill Gatic Lids to AS 3996. | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **4.7** | | Brass Marker Plates | | | Spec. 0002 General Electrical Installation [Cl 6.11]  Drawings | | Brass marker plates to be installed at each pit showing cable/conduit routes, contact phone number, organisation & drawing number. | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **4.8** | | Backfill - Pits | | | Spec. 0002 General Electrical Installation [Cl 6.6] | | Backfill the full width of trench with compacted sand to above the level specified for compacted sand, back to natural surface level.  *Layers not to exceed* ***150mm*** *compacted thickness.* | | | Yes  No  N/A | | S |  | | S |  | | S | |  |  | |
| **4.9** | | Compaction | | | Spec. 0002 General Electrical Installation [Cl 6.6]  Spec. 1112 Earthworks (Roadways) [Cl 4.13, 7.1] | | Each layer to be compacted to a density that is no less than the density of the existing adjacent material. If the existing material density is unknown, minimum relative compaction to be:   * 95% for pit and conduit bedding * 97% for select fill areas * 92% for general fill areas | | | Yes  No  N/A | | S |  | | S |  | | S | |  | Test reports | |
| **4.10** | | Rope and Mandrel | | | Spec. 0002 General Electrical Installation [Cl 6.7.5] | | Draw ropes or wires to be installed in all conduits that will require further cabling.  All conduits to be mandrel inspected prior to cabling to check for blockages.  **WITNESS POINT – Prior to Cabling** | | | Yes  No  N/A | | **H** |  | | **W** |  | | **W** | |  |  | |
| **5.0 Conformance Check** | | | | | | | | | | | | | | | | | | | | | | |
| **5.1** | | Survey Report | | |  | | An as-built survey of the conduit and pit system has been completed to ensure all structures are within construction tolerances. | | | ☐ Yes ☐ No ☐ N/A | | R |  | | R |  | | R | |  | Survey report | |
| **5.2** | | Acceptance and closure of non-conforming items | | | Spec. 0161 Quality [Cl 3.8] | | NCRs to be opened for non-conforming items and closed prior to closing construction lot.  **HOLD POINT** | | | ☐ Yes ☐ No ☐ N/A | | **H** |  | | **H** |  | | **H** | |  |  | |
|  | |  | | | **Comments**: | |  | | |  | |  |  | |  |  | |  | |  |  | |
|  |  | | |  | | | | | | | | | | | | | | | | | |  |
|  |  | | |  | | | | | | | | | | | | | | | | | |  |
|  |  | | |  | | | | | | | | | | | | | | | | | |  |
|  |  | | |  | | | | | | | | | | | | | | | | | |  |
|  |  | | |  | | | | | | | | | | | | | | | | | |  |
|  |  | | |  | | | | | | | | | | | | | | | | | |  |

**Lot acceptance:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Acceptance of works:** | | | | |  | |
| Symal Infrastructure representative name |  |  | Symal Infrastructure representative signature |  | Date |  |
| UGL representative name |  |  | UGL representative signature |  | Date |  |
| SHL representative name |  |  | SHL representative signature |  | Date |  |

**Inspection Checklist Report**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Project no.** | CC0375 | **Project name:** | Hunter Power Project | | **Date:** |  |
| **Symal ITP no.** | CC0375-ITP-008 | | | | | |
| **UGL ITP no.** | 3200-0663-HPP-QA-ITP-009 | | **SHL ITP no.** | | HPP-UGL-QUA-GN-GEN-ITP-0009 | |
| **Symal Lot no.** |  | | | | **Symal Sub Lot no.** |  |
| **Location (chainages, detailed description or marked up plan)** | | | |  | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Verify of acceptance by** | | | | | | | **Remarks / records** |
|  | **Symal** | | **UGL** | | **SHL** | | |
| **ID No.** | **Activity to be verified** | **ITP Step No.** | **Items conforms?** | | | **NCR / Test Report No.** | **Key** | **Sign Date** | **Key** | **Sign Date** | **Key** | **Sign Date** |  | |
| Yes | No | NA |
| **Preliminaries** | | | | | | | | | | | | | | |
| 1. | Documentation | 1.1 |  |  |  |  | S |  | S |  | S |  |  | |
| 2. | Lot Traceability | 1.2 |  |  |  |  | S |  | S |  | S |  | Lot map | |
| 3. | Underlying Lot Conformance | 1.3 |  |  |  |  | S |  | S |  | S |  |  | |
| 4. | Set out | 1.4 |  |  |  |  | S |  | S |  | S |  |  | |
| **Material Conformance** | | | | | | | | | | | | | | |
| 4. | Conduit Supply | 2.1 |  |  |  |  | S |  | S |  | S |  | Material certifications | |
| 5. | Pit Supply | 2.2 |  |  |  |  | S |  | S |  | S |  | Material certifications | |
| 6. | Embedment Material | 2.3 |  |  |  |  | S |  | S |  | S |  | Material certifications | |
| **Excavation, Installation and Backfill - Conduits** | | | | | | | | | | | | | | |
| 7. | Excavation | 3.1 |  |  |  |  | S |  | S |  | S |  |  | |
| 8. | Place bedding | 3.2 |  |  |  |  | S |  | S |  | S |  |  | |
| 9. | Conduit Installation  **WITNESS3.3 POINT** | 3.3 |  |  |  |  | **W** |  | **W** |  | **W** |  |  | |
| 10. | Conduit bends | 3.4 |  |  |  |  | S |  | S |  | S |  |  | |
| 11. | Marker Tape | 3.5 |  |  |  |  | S |  | S |  | S |  |  | |
| 12. | Backfill – Conduits | 3.6 |  |  |  |  | S |  | S |  | S |  |  | |
| 13. | Compaction | 3.7 |  |  |  |  | S |  | S |  | S |  | Test reports | |
| 14. | Cable Markers | 3.8 |  |  |  |  | S |  | S |  | S |  |  | |
| **Excavation, Installation and Backfill - Pits** | | | | | | | | | | | | | | |
| 15. | Excavation | 4.1 |  |  |  |  | S |  | S |  | S |  |  | |
| 16. | Place Bedding | 4.2 |  |  |  |  | S |  | S |  | S |  |  | |
| 17. | Pit Installation  **WITNESS POINT** | 4.3 |  |  |  |  | **W** |  | **W** |  | **W** |  |  | |
| 18. | Pit Drainage | 4.4 |  |  |  |  | S |  | S |  | S |  |  | |
| 19. | Step Irons | 4.5 |  |  |  |  | S |  | S |  | S |  |  | |
| 20. | Access Covers | 4.6 |  |  |  |  | S |  | S |  | S |  |  | |
| 21. | Brass Marker Plates | 4.7 |  |  |  |  | S |  | S |  | S |  |  | |
| 22. | Backfill – Pits | 4.8 |  |  |  |  | S |  | S |  | S |  |  | |
| 23. | Compaction | 4.9 |  |  |  |  | S |  | S |  | S |  | Test reports | |
| 24. | Rope and Mandrel  **WITNESS POINT – Prior to Cabling** | 4.10 |  |  |  |  | **W** |  | **W** |  | **W** |  |  | |
| **Conformance Check** | | | | | | | | | | | | | | |
| 25. | As-builts | 5.1 |  |  |  |  | R |  | R |  | R |  | Survey report | |
| 26. | Acceptance and closure of non-conforming items | 5.2 |  |  |  |  | **H** |  | **H** |  | **H** |  |  | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| I certify that this Lot conforms to the requirements of the design and specifications; that all associated NCRs have been closed out: and all survey, conformance testing and inspections have been undertaken in accordance with the specified requirements. | | | | |
|  |  |  |  |  |
| **Symal Representative** |  | **Signature** |  | **Date** |
|  | | | | |
|  |  |  |  |  |
| **UGL Representative** |  | **Signature** |  | **Date** |
|  | | | | |
|  |  |  |  |  |
| **SHL Representative** |  | **Signature** |  | **Date** |
| **Comments:** | | | | |
|  | | | | |
|  | | | | |
|  | | | | |