**Consent No XXXX**

**S224 – Infrastructure Assessment Checklists**

Carterton District Council

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## Completion Documentation

*Dispensations or exemptions will be at Council’s discretion and is provided on case by case basis.*

| **Item** | **Description** | **Yes** | **N/A** | **Comments** |
| --- | --- | --- | --- | --- |
| 1 | The geotechnical reports and as-built plans required by Section 2.6 of NZS4404:2010 |  |  |  |
| 2 | As-built plans of all infrastructure showing the information set out in Schedule 1D. As – built plans may be required as electronic data where a standard data format has been agreed between the LA and the developer |  |  |  |
| 3 | Evidence that all testing required by NZS4404:2010 has been carried out and that the results comply with the requirements of this Standard |  |  |  |
| 4 | Evidence that reticulation and plant to be taken over by the network utility operators have been installed to their standards and will be taken over, operated, and maintained by the network utility operator concerned |  |  |  |
| 5 | Completion certificates as per Schedules 1B and 1C |  |  |  |
| 6 | Certification by a suitably qualified person where they have recommended a specific design and construction has been undertaken in accordance with that recommendation. The certification shall state that the suitably qualified person supervised the construction, and it has been completed in accordance with the recommended design principles. |  |  |  |
| 7 | Other documentation required by the TA including, but not limited to, operation and maintenance manuals, and warranties for new facilities involving electrical or mechanical plant and asset valuations for all infrastructures to be taken over by the TA. |  |  |  |

## Council Notification and Inspections

In accordance with Clause 1.8.5 of NZS4404:2010. Council shall be given at least 24 hours’ notice to enable inspections to be carried out.

*Dispensations or exemptions will be at Council’s discretion and is provided on case by case basis.*

| **Item** | **Description** | **Yes** | **N/A** | **Comments** |
| --- | --- | --- | --- | --- |
| 1 | Written notification to Council of the names and addresses of contractors to whom it is proposed to award the contract and the nature of construction in each case |  |  |  |
| 2 | Notification of Commencement of construction |  |  |  |
| 3 | Notification prior to concrete construction |  |  |  |
| 4 | Inspection of prepared earthworks and subsoil drainage prior to filling |  |  |  |
| 5 | Inspection of completed earthworks and prepared subgrade |  |  |  |
| 6 | Water, wastewater, and stormwater reticulation prior to backfilling |  |  |  |
| 7 | Water and wastewater reticulation during pressure testing |  |  |  |
| 8 | Finished basecourse before the commencement of road sealing |  |  |  |
| 9 | Disinfection of watermains |  |  |  |
| 10 | Level of construction supervision agreed between developer and LA |  |  |  |

## Earthworks and Geotechnical Requirements

*Dispensations or exemptions will be at Council’s discretion and is provided on case by case basis.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Description** | **Yes** | **N/A** | **Comments** |
| 1 | Post Construction  Geotechnical Completion Report to the TA in accordance with Section 2.6.1 of NZS4404:2010. Where NZS 4431 is applicable, the reporting requirements of that Standard shall be used as a minimum requirement. |  |  |  |
| 2 | Completion certificates as per Schedule 2A |  |  |  |
| 3 | As-built plans showing finished contours, original contours, and other information in accordance with Section 2.6.2 of NZS4404:2010. |  |  |  |

## Roads

*Dispensations or exemptions will be at Council’s discretion and is provided on case by case basis.*

| **Item** | **Description** | **Yes** | **N/A** | **Comments** |
| --- | --- | --- | --- | --- |
| 1 | California Bearing Ratio (CBR) Test   * Test Results provided * Tested at depths 150,300 and 450 below subgrade level * Design CBR = C – 1.3 S   C = Mean of all CBRs; S = Std Deviation   * Performed at 20m intervals in alternate lanes[[1]](#footnote-1) |  |  |  |
| 2 | Scala Penetrometer Test  (Alternative to CBR test) |  |  |  |
| 3 | Footpath Checks NZS4404:2010   * Width > 1.5m * Surface Finish (Concrete or Asphaltic Concrete or other materials as per 3.3.11.33) * Construction joint / Saw cut ≤ 3m apart |  |  |  |
| 4 | Berms   * Grass strike >90% * Weed free (Visual inspection) |  |  |  |
| 5 | Traffic Signs installed |  |  |  |
| 6 | Road marking installed |  |  |  |
| 7 | Fire Hydrant include RRPMs |  |  |  |
| 8 | Road name signs |  |  |  |
| 9 | Street furniture (benches etc) if applicable |  |  |  |
| 10 | Road lighting |  |  |  |
| 11 | **Private ROWs**  Turning Head in common Area   * Circular * L – shaped * T – Shaped * Y shaped |  |  |  |
| 12 | **Private ROWs**  Passing Bays   * Urban = 5.5 over 15m, 50m spacing * Rural = 5.5 over 15m, 100m spacing |  |  |  |
| 13 | **Private ROWs**  Stormwater attenuation   * Access sloping up – sump at boundary * Access sloping down – Road run-off unlikely to pass down the access or flow path departing road reserve is directed to follow designed overland flow path. |  |  |  |
| 14 | **Private ROWs**   * Min. formation thickness = 150mm   or   * Min. concrete thickness = 100mm |  |  |  |
| 15 | **Private ROWs**  Surface Material   * Asphaltic Concrete (25mm) * Concrete (25mm) * Chip Seal * Concrete pavers |  |  |  |
| 16 | Vehicle Crossings provided (Concrete only) |  |  |  |
| 17 | Pram and Wheelchair crossings at all road intersections. |  |  |  |
| 18 | **Rural access**   * Access sloping up – Sealed for 10m from road edge * Culvert diameter minimum 300mm |  |  |  |
| 19 | **Rural access**  Fencing provided along road reserve, cycle, and pedestrian reserve. |  |  |  |
| 20 | Kerb and channel profile compliant with Figure 3.7 |  |  |  |
| 21 | Sump Type   * Double Sump (Traditional + Back entry) where possible * Double back entry at Sag points  (N/A for ROW) * < 90m apart * Trapped outlet * Cycle friendly[[2]](#footnote-2) |  |  |  |
| 22 | Sump Lead diameter ≥ 300 mm[[3]](#footnote-3) |  |  |  |
| 23 | Sub-base material   * < 60% of the depth of layer or * 65mm * Minimum 100mm deep |  |  |  |
| 24 | Basecourse material   * TNZ M/4 * As agreed with CDC |  |  |  |
| 25 | Surface material   * DG7/DG10 Hot mix asphalt (30mm) with membrane seal coat * DG7/DG10 Hot mix asphalt (50mm) with membrane seal coat in commercial and industrial turning heads * Two coat chip seal (G4/G6) * Concrete (Private ROW) |  |  |  |
| 26 | For Asphalt seals   * Membrane seal coat – Grade 5 aggregate * Application rate = 1 L/m² |  |  |  |
| 27 | Compaction Records   * Sub-base > 92% and 95% mean MDD * Basecourse > 92% and 95% mean MDD |  |  |  |
| 28 | Pre-seal inspection of surface preparation |  |  |  |
| 29 | Deflection testing (N/A for concrete) by Benkelman Beam Test  95% of all test results shall comply with Beam standards in NZS4404:2010  Residential Limits (mm)   |  |  |  |  | | --- | --- | --- | --- | | **Type** | **Avg** | **Max** | **+25%** | | Lane | 1.5 | 1.8 | 2.25 | | Local Road | 1.5 | 1.8 | 2.25 | | Collector | 1.25 | 1.5 | 1.9 |   Industrial and CBD (mm)   |  |  |  |  | | --- | --- | --- | --- | | **Type** | **Avg** | **Max** | **+25%** | | Lane | 1 | 1.2 | 1.5 | | Local Road | 1 | 1.2 | 1.5 | | Collector | 1 | 1.2 | 1.5 |  * Reading interval <10m * Both lanes |  |  |  |
| 30 | Tactile pads at kerb /pram crossings |  |  |  |

## Stormwater

*Dispensations or exemptions will be at Council’s discretion and is provided on case by case basis.*

| **Item** | **Description** | **Yes** | **N/A** | **Comments** |
| --- | --- | --- | --- | --- |
| 1 | Soakage/Infiltration testing results provided to Council |  |  |  |
| 2 | Geotechnical report for soil suitability for soakage and groundwater characteristics |  |  |  |
| 3 | For any Low Impact Design (LID[[4]](#footnote-4)) features   * Council consultation during design (Integrated approach Section 4.3.7.2) * Operations & Maintenance Report * Planting Plan (if applicable) |  |  |  |
| 4 | For wetlands;   * Depth ≤ 1m * Species planted (as per planting plan) |  |  |  |
| 5 | For Rain gardens; species planted in accordance with planting plan |  |  |  |
| 6 | Pipelines and Manhole located in private property protected by easement width no less than 3m. |  |  |  |
| 7 | New secondary overland flow paths protected by easement |  |  |  |
| 8 | Fish passage through culverts |  |  |  |
| 9 | Energy dissipation devices (rip-rap aprons etc.) provided at outlets |  |  |  |
| 10 | Manholes located at   * Upstream termination * <120m apart * Change in direction, grade, pipe size * Branching lines |  |  |  |
| 11 | Mini – Manholes (≤ 600 mm dia.)  Depth to invert ≤ 1.2m |  |  |  |
| 12 | Benching & Haunching |  |  |  |
| 13 | Invert Channel – ½ round PVC or EW tiles |  |  |  |
| 14 | Connection diameters (if applicable)   * 100mm (Residential) * 150mm (Commercial and industrial) * 200mm (3 or more lots) |  |  |  |
| 15 | Pipeline foundation stability record |  |  |  |
| 16 | Compaction Records  **For flexible pipes (AS 2566.2)**   * Bedding / Embedment – 95% MDD for graded aggregate at 1 test per 2 layers per 100m of length. (N/A for single sized chip) * Diametral Deflection Test * Backfill – Same as Sub-base   **For Concrete pipelines  (Type HS2 AS 3725)**   * Bed Zone – 90% (min. 85%) * Haunch Zone – 90% (min. 85%) * Side Zone – 90% (min. 85%) * Overlay – 90% (min. 85%) * Backfill – Same as Sub-base   **For Precast Box Culverts (AS 1597.2)**   * Bed Zone – 90% MDD * Side Zone – 90% MDD * Overlay – 90% MDD * Backfill – Same as Sub-base |  |  |  |
| 17 | **CCTV[[5]](#footnote-5)**   * Log sheets * CCTV Inspections * Electronic Data (if specified) * Still images (of any defects) * CCTV summary sheets |  |  |  |
| 18 | Leakage Test Records (if required by CDC)   * Test Pressure * Low pressure air test * Low Pressure Water (Hydrostatic) |  |  |  |
| 19 | Soak pit dimensions (L X W X D) checked by Engineer or Council |  |  |  |
| 20 | Drainlayer / Level 4 Water Reticulation Certificate copy |  |  |  |
| 21 | Approved Connection Application |  |  |  |

## Wastewater

*Dispensations or exemptions will be at Council’s discretion and is provided on case by case basis.*

| **Item** | **Description** | **Yes** | **N/A** | **Comments** |
| --- | --- | --- | --- | --- |
| 1 | Connection diameters (if applicable)   * 100mm (1 dwelling) * 150mm (>1 dwelling, commercial, industrial and reticulation) |  |  |  |
| 2 | Pipelines and Manhole located in private property protected by easement width no less than 3m. |  |  |  |
| 3 | Manholes/MS located at   * Intersection of pipes (except laterals) * Change in grade, pipe size * Changes in direction  (Max 33 degrees using MS) * Change in invert level * Changes in pipe material * Permanent or temporary ends * Discharge of a pressure main into a gravity pipe (Manhole only + vented) * <120m apart |  |  |  |
| 4 | Cover opening ≥ 600mm diameter for MH (N/A for MS) |  |  |  |
| 5 | Bolt-down covers (if applicable)   * Risk of surcharge * Along creeks subject to flooding over the lid level |  |  |  |
| 6 | Maintenance shafts not placed at   * Pipes > DN225 * Junctions * Discharge points of pumping mains |  |  |  |
| 7 | Venting   * At pump Stations * At rising main discharge manholes * Entrances and exits to inverted siphons |  |  |  |
| 8 | Pipeline foundation stability record |  |  |  |
| 9 | Compaction Records  **For flexible pipes (AS 2566.2)**   * Bedding / Embedment – 95% MDD for graded aggregate at 1 test per 2 layers per 100m of length. (N/A for single sized chip) * Diametral Deflection Test * Backfill – Same as Sub-base |  |  |  |
| 10 | **CCTV[[6]](#footnote-6)**   * Log sheets * CCTV Inspections * Electronic Data (if specified) * Still images (of any defects) * CCTV summary sheets |  |  |  |
| 11 | Leakage Test Records   * Test Pressure * Low pressure air test * Low Pressure Water (Hydrostatic) |  |  |  |
| 12 | Leakage Test Records (Pressure sewer)   * Test Pressure * Maximum Length < 1km * Constant Water loss * Constant water loss / Pressure decay (for PE) * Pressure Rebound (For PE) |  |  |  |
| 13 | Drainlayer / Level 4 Water Reticulation Certificate copy |  |  |  |
| 14 | Approved Connection Application |  |  |  |

## Water Supply

*Dispensations or exemptions will be at Council’s discretion and is provided on case by case basis.*

| **Item** | **Description** | **Yes** | **N/A** | **Comments** |
| --- | --- | --- | --- | --- |
| 1 | Hydrant locations   * As per Firefighting Code (135m) * At temporary and permanent dead/ends * At the end of staged mains 2m beyond the finished road construction |  |  |  |
| 2 | Hydrant marking |  |  |  |
| 3 | Scour Valves at end of ridermains |  |  |  |
| 4 | Manifolds |  |  |  |
| 5 | Water meter – Sensus Smart |  |  |  |
| 6 | Meter Serial Nos |  |  |  |
| 7 | Last Meter reading (optional) |  |  |  |
| 8 | Pipe Joint Testing results (if applicable) e.g., PE weld test results, steel welding photos  (if available) |  |  |  |
| 9 | Corrosion protection |  |  |  |
| 10 | * Valves > 50mm Anti-clockwise close * Valves ≤ 50 mm Clockwise close |  |  |  |
| 11 | Valve Extension spindles for depth >350mm |  |  |  |
| 12 | Temporary Dead end mains terminated with hydrant and valve |  |  |  |
| 13 | Pipeline foundation stability record |  |  |  |
| 14 | Compaction Records  **For flexible pipes (AS 2566.2)**   * Bedding / Embedment – 95% MDD for graded aggregate at 1 test per 2 layers per 100m of length. (N/A for single sized chip) * Diametral Deflection Test * Backfill – Same as Sub-base |  |  |  |
| 13 | Drainlayer / Level 4 Water Reticulation Certificate copy |  |  |  |
| 14 | Approved Connection Application |  |  |  |
| 16 | Detector tape and tracer wire – Photos acceptable |  |  |  |
| 17 | Pressure Test Records   * Test Pressure * Maximum Length < 1km * Constant Water loss * Constant water loss / Pressure decay (for PE) * Pressure Rebound (For PE) |  |  |  |
| 18 | Disinfection of Watermains  **Initial Test**   * Initial Disinfection 15-20 ppm * 24 – hour residual 5ppm   **Lab Test**   * FAC < 1ppm * E. coli < 1 |  |  |  |

## Landscape

*Dispensations or exemptions will be at Council’s discretion and is provided on case by case basis.*

| **Item** | **Description** | **Yes** | **N/A** | **Comments** |
| --- | --- | --- | --- | --- |
| 1 | Consultation with P&G regarding landscaping |  |  |  |
| 2 | Tree and plant specimens in accordance with P&G requirements |  |  |  |
| 3 | Tree and vegetation plan / Construction methodology approved by CDC |  |  |  |
| 4 | Landscaping structures (sculptures, walls, fences, screens, bollards etc.)   * Does not inappropriately limit safe sight lines * Does not cause hazard to pedestrians, disabled people, cyclists, or vehicles. |  |  |  |
| 5 | Building Consent / Exemption copy provided for any landscape structures |  |  |  |
| 6 | Fencing of reserves   * Fencing covenant for neighbouring lots (cost indemnity) in accordance with Section 7.3.9 of NZS4404:2010 |  |  |  |
| 7 | Permanent or temporary irrigation of tree/plant specimens |  |  |  |
| 8 | Maintenance period agreed with developer |  |  |  |
| 9 | Maintenance period bond received |  |  |  |
| 10 | Post maintenance period   * Weed & litter free plantation within 2m radius * Weed & litter free within 2m of any tree radius |  |  |  |
| 11 | Mulch applied to all tree and planting areas |  |  |  |
| 12 | Mulching radial distance of 500mm around trees or to a drip line |  |  |  |
| 13 | Specimen trees   * In planter bag > 54L * Minimum Height = 2.5 (recommended) |  |  |  |
| 14 | Trees secured with example ties at approx. 1/3 of its height or anchored below ground |  |  |  |
| 15 | Developer is made aware that trees are to be protected during further development of the subdivision (i.e., construction of dwellings etc) and during maintenance period (if applicable) |  |  |  |
| 16 | Items to be addressed   * Temporary services * Machinery * Clear surplus materials * Clean and weed all channels * Dead/vandalised plants replaced * Planting beds are cleaned to remove pruning, dead or damaged leaves. |  |  |  |
| 17 | Reserves   * Land is relatively weed free * Tree stumps (above ground) * Previous fences, farm utilities, building remains and rubbish * Maintenance machinery access check * Boundaries surveyed and pegged * Easement formalised * Planting or furniture structures completed as agreed with CDC P&G |  |  |  |

## Network Utility Services (Power and Telecom)

*Dispensations or exemptions will be at Council’s discretion and is provided on case by case basis.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Description** | **Yes** | **N/A** | **Comments** |
| 1 | Developer to provide written and satisfactory evidence that all arrangements with appropriate network utility operators for the supply of power and telecommunication have been made and that the utility operators are prepared to reticulate the subdivision and that agreement on financial arrangements has been reached. |  |  |  |

## As built Information

*Dispensations or exemptions will be at Council’s discretion and is provided on case by case basis.*

| **Item** | **Description** | **Yes** | **N/A** | **Comments** |
| --- | --- | --- | --- | --- |
| 1 | Asset Attribute data provided |  |  |  |
| 2 | Stormwater and wastewater reticulation –   * coordinated positions of manholes, * manhole inverts, * inverts of pipes and lid levels, * measurements to house connections, laterals, and length |  |  |  |
| 3 | Stormwater management devices – as-built plans for LID and non-reticulated components |  |  |  |
| 4 | * Flood and secondary flow information, * Flood water levels and * The extent of any overland secondary flows |  |  |  |
| 5 | Water reticulation – All features shall be accurately dimensioned & coordinated   * Position of mains * Location of hydrants * Valves * Tees * Reducers * Connections * Tobies * Water meters and specials |  |  |  |
| 6 | Ducts – measurements to ducts installed by the developer for utilities. |  |  |  |
| 7 | Road names (where available) |  |  |  |
| 8 | Coordinates of all utility surface features taken over by the TA (List out below)   * Wastewater inspection points * Pressure sewer inspection points * Add more…. |  |  |  |
| 9 | Coordinates of at least 2 points in each plan showing geodetic or cadastral datum and origin of the plan level datum  (no arbitrary datum acceptable) |  |  |  |
| 10 | Geotechnical completion report and as builts (if applicable) |  |  |  |
| 11 | As-built surface contours of all areas disturbed and cut/fill ground |  |  |  |
| 12 | Road construction   * Location * Structural details * Road marking * Lighting and signs * Landscape features * Seating (if applicable) * Other amenities |  |  |  |
| 13 | Road pavement and surfacing information |  |  |  |
| 14 | Landscape amenities and features. |  |  |  |

## Defects List – For Internal Use

*Dispensations or exemptions will be at Council’s discretion and is provided on case by case basis.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **Remedial Actions** | **Confirmed Complete** |
| 1 |  |  |  |
| 2 |  |  |  |

## Photos

*Add more pages as required*

## Risk assessment methodology

The review of S224, making decisions, seeking dispensations and exemptions shall be based on an assessment of the risk of future major repair costs using the matrix in Table 1 below. In this matrix, the risk of future major costs depends on

* The likelihood of defects, which depend on the reliability of the QA[[7]](#footnote-7) records provided.
* The consequences of defects, which is related to the nature of potential defects in the asset component being constructed and its potential future repair costs, including traffic disruption and delay costs.

Table 1 - Risk Assessment Matrix

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  | **Risk of future major cost** | | |
| Components that could significantly affect durability and functional performance and lead to high cost maintenance and rehabilitation and traffic disruption. | Consequences of defects (potential repair and disruption costs) | Major | Very high | High | Medium |
| Components which can be repaired or replaced without significant disruption. | Minor | High | Medium | Low |
|  |  |  | Very unreliable | Unreliable | Reliable |
|  |  |  | **Likelihood of defects**  (Reliability/Integrity of the QA records provided) | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Review Activity** | | **Assessment criteria** | **Reliability / integrity assessment rating** | | |
| **Very unreliable** | **Unreliable** | **Reliable** |
| **Preconstruction review** | Review Construction Procedures | Completeness (to achieve specification outcomes) | Significant amendments | Minor amendments | Fully comply |
| Review ITP’s | Structure (checkpoints) and clarity of accountabilities | Poorly structured and difficult to use | Structure unlikely to facilitate QA recording in the field | Clear separation of ITP and QA record templates/clear accountabilities |
| **Construction reviews** | Targeted observation of construction process | Compliance with approved procedures | Departures likely to affect product | Departures unlikely to affect product | Approved procedures applied correctly |
| Witness Hold Points and Witness Points | Integrity of checking and documentation | Non- conformance not identified | Checking/testing/OK but inadequate records | Checking/testing/ recording OK |
| Release of hold points by QA verifier (where applicable) | QA verifier did not inspect works |  | QA verifier inspected works before releasing hold point |
| Closure inspections | Works / Product compliance | Significant defects | Minor defects | No defects |
| **QA system audits** | Audit construction records and as-built records | Required records up to date / correct scope of testing | Inadequate records/ inadequate testing | Adequate testing but records not quite up to date. | Adequate testing/records complete, current, and accurate |
| QA records management system capability | No auditable system for tracking and retention of records |  | Systematic, controlled, and auditable recording system for tracking and retention of records |
| Audit non-conformance control | Notification/ recording of non-conformances | Some not notified/recorded |  | All notified and recorded |
| HP release – product non-conformances | NC’s closed without agreement of agency | Significant backlog | NC’s progressively issued for agreement of agency |
| Corrective action | Non- conformances re-occur | Corrective action not systematic | Systematic QA system response |

## Risk assessment

*Where risks associated Council vested assets are assessed as medium or higher, the risk assessment must be reviewed and accepted in writing by Carterton District Council’s Infrastructure Services Manager prior to awarding s224.*

*The Council may require proposed controls for any significant risks that could be owned by private owners to be noted against the affected title as a s221 consent notice.*

| **Description** | **Category** | **Consequence** | **Reliability of QA records** | **Risk Rating** | **Proposed Controls** | **Risk Owner** |
| --- | --- | --- | --- | --- | --- | --- |
| Describe the risk | Roads/  Stormwater/  Wastewater/  Water etc. | Minor | Unreliable | Medium | <User defined> | CDC/  Private |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |

1. Not stipulated in NZS4404:2010 but is recommended. [↑](#footnote-ref-1)
2. Grates with bars transverse to the side-channel direction or closely spaced bars in wavy pattern in a longitudinal direction [↑](#footnote-ref-2)
3. Minimum 200mm; 300mm desirable - Recommend 300mm [↑](#footnote-ref-3)
4. See section 4.3.7.3 of NZS4404:2010 for a list of LID features [↑](#footnote-ref-4)
5. All deliverables must be in accordance with NZ pipe inspection manual [↑](#footnote-ref-5)
6. All deliverables must be in accordance with NZ pipe inspection manual [↑](#footnote-ref-6)
7. Quality Assurance [↑](#footnote-ref-7)