

For Construction

Construction Specifications – Sports field drainage and turf establishment

**For the reinstatement of the upper and lower sports field platforms at
Prince of Wales Park**

December 2020

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CONTACT DETAILS

Sports Surface Design & Management

Postal address: PO Box 33-127, Takapuna, Auckland, 0740
PO Box 76, Christchurch Central Box Lobby, 8140

Physical address: 64 Porana Road, Hillcrest, Auckland 0627
3/75 Gloucester St, Christchurch Central, 8013

Website: www.ssdm.co.nz

Contact: Blair Cornthwaite
T 09 441 9804, M 021 875 680
E blair.cornthwaite@ssdm.co.nz

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Part 1 – General Specifications

1 General Information

1.1 DESCRIPTION

This Specification is for the construction and turf establishment of two: 'Upper and lower' (reinstated) top-soiled sports fields as part of the Omāroro Reservoir works at Prince of Wales Park, Wellington. Irrigation for the grow-in and turf grass establishment shall be by way of a newly installed automated irrigation system- see sperate specification.

1.2 FULL SCOPE AND TIMING OF WORKS

The Works involved in this Specification are:

1. Initial trimming of sub grade to form general level (including swales)
2. (Imported) topsoil placement and amendment.
3. Installation of primary subsoil drainage system
4. Final trim of top-soiled surface to correspond to design grades
5. Seeding
6. Grow-in and turfgrass establishment.

Unless agreed by the Engineer in advance, all works shall be completed in the above order.

Parts 2, 3 & 4 of these specifications cover materials and installation requirements for grading, drainage and grassing operations. Part 5 covers key inspection sign off points and sign off detail.

1.3 DRAWINGS AND DOCUMENTS

The following drawings form part of this Specification and Tender Documents:

- 3262332-CE-1401 Upper Sports Field Finished Level & Drainage Plan
- 3262232-CE-1402 Upper Sports Field Cross Sections
- 3262332-CE-1403 Upper Sports Field Surface Drainage Details
- 3262332-CE-1501 Lower Sports Field Finished Level & Drainage Plan
- 3262332-CE-1502 Lower Sports Field Cross Sections
- 3262332-CE-1403 Lower Sports Field Surface Drainage Details
- 2262332-CE-3303 Drainage Details Sheet 2 of 3

The Drawings do not guarantee to show all detail of all Works required for this project. This written Specification shall be referred to throughout for specific detail, in conjunction with the Drawings, Contract Instructions and Variation Orders. It shall be the Contractor's responsibility to ensure that each item is complete and functional and will fit in the Works and operate in the manner intended. All documents shall be read together and anything mentioned in or reasonably inferred from one but omitted from another shall be equally binding as though included in all.

Where an item or items are omitted from this specification but are obviously necessary for the satisfactory completion of the work, the Contractor shall bring this to the attention of the Engineer and shall allow for the same in this quotation as an Unscheduled Item.

1.4 SITE INFORMATION

1.4.1 Location and access

The Omāroro Reservoir project involves the installation of a 35 mega litre reservoir that will be buried at the location of the Prince of Wales Park, Mt. Cook, Wellington. Due to the scale of this project a significant amount of spoil shall be generated from excavations which facilitate the installation and construction of the reservoir structure. It has been proposed that the majority of this spoil will be placed and stockpiled on the upper and lower sports fields at the Park. In addition to this there will be a need to operate and store construction equipment on these platforms as well as create temporary erosion and sediment containment devices.

Following completion of the reservoir installation, the 2 sports fields are to be reinstated to *at least* the same standard as prior to the works. The aim of the Client is to enhance the performance of the existing sports fields upon handing back to the Council. This will be achieved through the improvement of the existing (poor) surface levels and the installation of a primary sports field drainage system and automated irrigation to both fields.

Note: there is a provision for the installation of an automated irrigation system within the scope of the overall project.

1.4.2 Traffic machinery control

All traffic shall be confined to approved routes within the site and adherence to traffic regulations shall be observed, particularly with respect to ground conditions. Traffic routes shall be confirmed between the Engineer and the Contractor prior to works commencing.

The following traffic activities are expressly forbidden:

- Travel over unfilled or partially filled drain lines (unless protection boards are used).
- Travel over completed drain lines and prepared rootzones by any machinery or vehicle not directly associated with its installation or subsequent completion of the works (e.g. delivery vehicles taking a short cut).
- Vehicles turning directly over prepared rootzones (soil placement and trenching/backfilling vehicles excluded).
- Travel by any vehicle or machine over the surface area of the site that does not have appropriate turf and/or low ground pressure tires. Exceptions to this requirement will need prior approval of the Engineer (e.g. for delivery vehicles, agricultural cultivators, spray activities etc.).

1.4.3 Spoil disposal

All excavated material not required for the completion of the works shall be disposed off-site by the Contractor at their expense.

It is estimated that approximately 165 m³ (solid measure) of excess spoil (most likely a combination of clay and topsoil) will be generated from the excavation of primary drainage trenches.

1.5 TOPSOIL PLACEMENT, CULTIVATION, TRENCH EXCAVATION AND BACKFILLING

Every effort shall be made by the Contractor to carry out topsoil cultivation, trench excavation, pipe work and backfilling in reasonable quantities and lengths to allow completion of sections before the end of each day and/or the onset of rain.

All backfill and topsoil materials shall be consolidated to minimise future subsidence. In this respect consolidation means to settle the medium (e.g. soil/gravel) to the point where little or no further settlement occurs from maintenance machinery and foot traffic.

1.6 WORKS INSPECTION

The Contractor shall comply fully with requests by the Engineer for inspection of works. If the Contractor deliberately covers work before inspection, then the Engineer has the right to assume the works may be faulty and the Engineer may direct their reconstruction at the Contractor's expense.

The Engineer shall attempt to be present at all relevant times in order not to delay work in any way. If an inspection of works is required it will be the Contractor's responsibility to notify the Engineer, giving a minimum period of 24 hours' notice, or such a time as agreed between the Engineer and the Contractor.

The Contractor shall allow in their pricing for hand work on parts of the project and in conditions where the use of machinery will not produce results to the Engineer's satisfaction even though specific reference may not be made to such in the body of this Specification.

No variation from the sequence and nature of the works detailed in this Specification shall be permitted except with the prior written consent of the Engineer.

1.7 QUALITY CONTROL, MATERIAL HANDLING AND TESTING

Materials shall be stored and handled with care to avoid damage and in accordance with the manufacturer's recommendations. All manufactured materials (e.g. Pipe and fittings) used in the Works shall be in new condition.

All existing and imported materials (e.g. topsoil, compost, gravel, and seed) specified for the Works will be required to be analysed for suitability and approved prior to the commencement of work, as determined by the Engineer. The following information and testing results will be required to be supplied to the Engineer prior to the start of construction:

- Manufacturers and source data for all materials (e.g. topsoil, compost, aggregate, seed, fertiliser).

Samples provided by the Contractor for analysis shall be typical of materials to be delivered to the site and shall provide a true representation of their characteristics.

1.7.1 Materials storage

Seed, chemicals and fertiliser materials shall be delivered in original unopened packaging showing brand, weight, analysis and name of manufacturer. Storage shall be in a manner to prevent moisture ingress or intrusion of foreign matter and subsequent deterioration.

Materials such as gravel & topsoil etc. shall be kept in separate stockpiles in areas agreed by the Contractor and the Engineer. Materials shall be stockpiled in the nominated areas such that vehicular access to the entire site is maintained at all times. Stockpiles shall be protected from eroding while stockpiled on site and shall be stabilised after delivery according to any sediment control requirements.

Organic and topsoil-based materials shall not be delivered or installed in an excessively wet condition.

Following completion of the Works, all surplus material shall be removed from the storage areas and removed from the site at the Contractor's expense.

1.7.2 *Materials*

Materials shall be stored and handled with care to avoid damage and in accordance with the manufacturer's recommendations. All materials used in the works shall be in a new condition unless specific instruction is given to the contrary.

1.7.3 *Workmanship*

All workmanship shall be careful and thorough and in accordance with the best trade practice.

1.7.4 *Surface finishes*

Should any trade consider that any surface or construction by another trade is in an unsatisfactory condition to ensure a proper finish for their work thereon, the Contractor shall give due notice and such work shall not proceed until the necessary improvements have been made. Failing such notice, the trade concerned will not be relieved of the responsibility for poor finish due to such unsatisfactory conditions.

1.8 **AS-BUILT PLANS**

The Contractor shall be responsible for recording the positions of all services installed on site.

As-built drawings shall accurately show the layout of the work including the following:

- Type, class, location, direction of flow and nominal internal diameter (or relevant dimension) of all drains, pipes and structures in millimetres.
- Co-ordinates of all structures in terms of New Zealand Transverse Mercator
- Any areas where the drainage or irrigation systems have been damaged and repairs made to enable location of the repaired drain to within 0.5 m at a future date.

As-builts shall be provided in both .pdf and .dwg formats to the Engineer.

1.9 **MAINTENANCE OF PUBLIC ROADS**

The Contractor shall be responsible for keeping clear all public roads, pavements, verges, car parks and other areas and for making good at his own expense any damage or contamination thereto when carrying out the Works.

1.10 **KEY INSPECTION/HOLD POINTS**

Sign off of the sports field component of the works shall be agreed and issued upon completion of all works. i.e. Completion of the installation of the drainage system and grow-in of the sports fields.

Key Inspection points are detailed in section 5.

Prior to handover, the field will be measured against the performance standards outlined in the specifications (See Section 4.8). If any of the standards detailed have not been met then the field will not be deemed suitable for acceptance.

Refer to main contract Preliminary & General for Erosion and sediment control, Insurance, Health & Safety and Communication requirements.

Part 2 – Products, materials and testing

2 Drainage material and Growing media

2.1 GRAVEL

Where gravel aggregate backfill is shown in the drawings for backfilling lateral drains, it shall meet the following criteria:

The particle size distribution shall be:

Particle size (mm)	% passing
16	100
8	95-100
4	10-35
2	0-6
1	0-2

2.2 BLINDING SAND

Where blinding sand backfill is shown in the drawings for backfilling lateral drains, it shall meet the following criteria:

The particle size distribution shall be:

Particle size (mm)	% passing
8	98-100
4	92-100
2	75-100
1	50-95
0.5	10-60
0.25	0-20
0.125	0-2
0.63	0-1

2.3 DRAINS, PIPE AND FITTINGS

2.3.1 Collector drain and outlet

- Diameter: 150 mm
- Type: uPVC (SN4) Rubber Ring Joint
- Minimum installation gradient: 0.6%- See Drawings for grades

2.3.2 Lateral drain

- Diameter: 110 mm
- Type: Nexusflo
- Description: corrugated, smooth internal walled, perforated
- Minimum installation depth: 500mm
- Minimum installation gradient: 0.5% - To follow surface grade

- Lateral drain spacing: 7.5 m- unless shown otherwise on Drawings

2.3.3 Drain fittings

Purpose-built junction fittings shall be used to connect collector and lateral drains (e.g. 150 x 100 mm 45° junctions).

2.4 TOPSOIL

It is anticipated that in order to reinstate the sports fields approximately 2,288 cubic m (solid measure) of imported (approved) topsoil shall be required across both sports field platforms in order to achieve the desired (consolidated) depth of 150 mm topsoil above the formed sub-grade. This material must be an approved stone-free loam with a well-developed aggregate structure, sourced from a reputable supply company from stripped grassland or cultivated land. Soil arising from reclaimed land, industrial sites or which has been used for the disposal of industrial, domestic or agricultural wastes shall not be used.

The topsoil shall be screened to an 8 mm aggregate size. It shall not contain any foreign matter such as glass, stones, brick fragments, wood, concrete, steel, clay lumps, tree roots larger than 8mm measured across its largest dimension or other undecomposed plant remains.

A provisional item within the Schedule has been added for any instance where vegetation control is deemed necessary on any stockpiled topsoil source that has become weed-infested. In the event of such a scenario the Contractor will need to arrange for the stockpiles to be sprayed out at least 1 week prior to any on-site acceptance of the material.

The topsoil shall not contain any more than 15% organic matter, 25% clay and no more than 50% sand by weight. Nutrient and composition analysis is to be submitted to the engineer for approval prior to placement.

2.5 FERTILISERS

All fertilisers shall be uniform in composition, free flowing and suitable for application with approved equipment. Fertilisers shall be delivered to the site in their original packaging with legible intact labels showing nutrients analysis.

2.5.1 Soil amendments- fertiliser

The following soil amendments and fertilisers are approved to amend the site topsoil and are to be priced as provisional items. The Contractor is to supply a recent soil nutrient analysis (<6mths) of the approved topsoil to the Engineer for final recommendation of soil amendment fertiliser.

Potassic superphosphate: 50% potash super, containing approximately 4.5% phosphorus and 25% potassium.

Granular dolomite lime: containing a minimum of 12% magnesium and 24% calcium.

Granular gypsum: calcium sulphate, containing no less than 30% calcium.

Granular lime, containing a minimum of 35% calcium.

2.5.2 *Starter and grow-in fertilisers*

Di-ammonium phosphate (DAP): containing approximately 17% nitrogen and 20% phosphorus.

NPK compound fertilisers for sports turf application: materials with no more than 14% N (e.g. Nitrophoska Blue [12-5-14])

2.6 **GRASS SEED**

2.6.1 *Species and cultivar*

Where turfgrass seed is specified to be sown over prepared areas, the seed shall be a blend of 55---- approved cultivars of turf-type perennial ryegrass (80%), brown-top bent grass (10%) and slender creeping fescue (10%) by weight. The desired percentages of which shall be adhered to.

Cultivars selected by the Contractor for the above seed mixture must be approved by the Engineer prior to mixing.

2.6.2 *Quality*

All seed shall be certified true to type and shall be less than 12 months old. The Contractor shall provide the Engineer with seed P&G analysis certificates issued within 12 months of the scheduled sowing date showing:

- A minimum of 99% purity
- A minimum of 80% live endophyte (ryegrass)
- A minimum of 90% germination for all species and cultivars

2.7 **AGRICHEMICALS**

The following turf management chemicals shall be approved for use:

- Clopyralid (e.g. Versatill) at 1 L/ha for broad leaf weed control.
- Glyphosate (e.g. Round-up) at 2 L/ha to control weed growth prior to seeding

Additional herbicides may be approved for use, subject to the Engineer's approval.

Any spraying activities should be carried out in accordance with NZS 8409:2004 Management of Agrichemicals (or subsequent editions) and relevant Council by-laws.

2.8 **COMPOST (PROVISIONAL)**

Where compost is required for amending the site topsoil material, it shall meet the following criteria:

- The material shall be homogeneous and screened through an 8 mm screen for root zone amendment purposes.
- The material shall have a minimum organic matter content of 30% and should be derived primarily or urban green waste, free of material that is recognisable as being of plant origin (e.g. large twigs, leaves etc.). The compost shall not contain material derived from other sources (e.g. sewage sludge, bark fines, animal and food waste etc.).
- Compost shall be aged to a state of equilibrium and be free of undecomposed material.

- Material shall be composted to the mesophilic stabilisation phase such that the thermophilic (heat generating) process is complete.
- Compost used for any one project should come from a single batch of material. A production log may be required for each batch showing details of turning and screening as well as results of temperature and moisture tests.
- Any material added to the compost during the composting process shall be declared (e.g. lime, fertiliser, sand etc.).
- The compost supplied shall be declared free of viable weed seed and herbicide residues.
- Testing may be carried out and shall include measurement of pH, organic matter content, C/N ratio, moisture content, plus total N, P, K, Ca, Mg, Na and S. A bioassay may also be conducted to confirm that no residual herbicides are present. The compost supplied shall be expected to comply with the following ranges:

Item	Range/result
Particle sizing	> 95% particles through 8 mm mesh and 100% particles to pass through 15 mm mesh
pH	6.0-8.0
C:N Ratio	< or equal to 30:1
Organic Matter Content	> or equal to 30% by weight
Ash Content	< or equal to 70% by weight
Delivery Moisture Content	30-50% by weight
Total N	0.4-3.0% by weight
Total P	0.2-1.5% by weight
Total K	0.4-8.0% by weight
Odour	'Earthy' or 'musty'
Colour	Brown to black
Bioassay	Min. 80% germination after 10 days
Weed germination	No weed germination in bioassay

Part 3 – Sports Field Preparation

3 Topsoil placement, Surface levelling and preparation

The sports field platforms subgrade shall be formed to level (+0mm to -50mm) conforming to the surface grades (-0.15m) on Drawings 3262332-CE-1401 & 3262332-CE-1501 in preparation of topsoil placement. Trimming shall be required on completion of the topsoil placement & prior to primary subsoil drainage installation and also prior to sowing.

3.1 TOPSOIL PLACEMENT

Imported topsoil shall be used to create a 150mm (consolidated) topsoil layer after the sub grade has been graded to the correct shape.

All topsoil should be passed through an 8mm screen prior to placement on the sports field.

Topsoil used for creating the new soil profile shall be free from undecomposed vegetation and organic material, large lumps, saturated or soft materials and other deleterious substances as per Section 2.4). It shall be assumed that the stockpiles will have been sprayed off four weeks prior to removing the topsoil. In the event that soil stockpiles are still covered with vegetated material, such material shall be discarded and not used for placement on the subgrade.

The method of excavation, transport and depositing of topsoil shall be such to ensure the material is as uniform as possible. The Contractor shall vary the path of transporting plant over the top of the consolidated subgrade surface. Site topsoil material shall be placed in a systematic manner, with near horizontal layers of uniform thickness of material being deposited progressively across the full area of the subgrade. The unconsolidated thickness of each deposited layer shall be less than 150 mm unless otherwise approved and shall be limited to ensure that the bottom of each layer can be adequately consolidated. Gradients shall be maintained so that run-off is efficiently discharged to the edge of the site in order to minimise downtime lost to rain events.

Conventional self-propelled, rubber tyred earthmoving scrapers shall not be used for redistributing topsoil.

Before any loose layer of deposited topsoil material is consolidated, the soil shall be broken up so that it is free of lumps that exceed 100 mm largest dimension, and shall be brought to a uniform homogenous mixture and moisture content by mixing. There should be no rocks, stones or glass present.

Each layer of topsoil material shall be consolidated by plant specifically designed for compaction following patterns of parallel tracks that work progressively across the surface of the topsoil, with sufficient passes to ensure that a satisfactory level of compaction is achieved.

No topsoil material shall be placed, spread or compacted during or immediately following wet weather. Where any interruption in the earthmoving operation has resulted in drying out or cutting up of previously consolidated layers, these layers shall be reworked prior to placement of new topsoil by scarifying and re-consolidated.

Where the moisture content of the topsoil material is too high to achieve specified compaction, the material shall be air dried with assistance by discing or other means. The moisture content of the topsoil material shall also be low enough to provide a stable surface for earth moving and consolidating plant, free from weaving and excessive rutting. Unless specified otherwise the cost of all drying will be deemed to be included in the costs.

Unless specified otherwise, topsoil quantities shall be a solid measure of the consolidated topsoil in place established by survey of the original surface and a further survey after the topsoil is placed and

consolidated following levelling. Generally no allowance will be made in measurement for any extra quantity of topsoil that may be required as a result of settlement of topsoil during earthworks.

3.2 LEVELLING

Design surface grades shall be formed according to Drawings 3262332-CE-1401 & 3262332-CE-1501 with an initial level to be carried out prior to primary drainage installation. A single plane is shown and the Contractor shall ensure that the edges marry in smoothly with the surrounding contours and swales. A final trim will be required post drainage and topsoil placement, prior to sowing.

3.2.1 Equipment

Only machinery with an automatic dual axis laser grade function shall be acceptable. 'Automatic' means having the levelling equipment automatically controlled by electronic and hydraulic means, without having to manually adjust the height of the levelling bar during the grading process to achieve design levels.

It is envisaged that levelling equipment will be powered by a tractor of no more than 150 hp fitted with low ground pressure, rather than conventional tyres. A road grader or other heavy rubber tyred machine shall not be acceptable for working on the final surface. The levelling equipment should be able to cultivate and level in a single operation to prevent smearing and glazing of the topsoil

The requirement is to produce an accurately levelled and evenly compacted surface. The re-levelled surface must be free of all debris (e.g. stones, rubbish, soil clods, lumps of subsoil, twigs, branches, etc.). No deep (e.g. > 15 mm) wheel marks shall be visible.

3.2.2 Laser emitter set-up

The Contractor shall log the exact physical location of their laser emitter on site by GPS, and shall match the location and orientation of their laser emitter to two fixed reference points around the field (e.g. SWMH chamber lids). This information shall be logged on the as-built plans. The purpose of this is to ensure that when the unit is taken down and set up again for the same job, or when a field is re-levelled in the future, that the same set-up for the emitter is used. The Contractor shall also record the exact surface grades established on the completed surface (these may vary slightly from the original design grades due to adjustments made and agreed on site in order to minimise cut and fill depths and minimise the extent of level transitions from the newly graded surface to surrounding hard surfaces or intact ground levels).

3.2.3 Trimming

The field shall be accurately trimmed using laser-guided levelling equipment as described in Section 3.2.1, so that the grade indicated on the drawings is achieved.

Particular attention shall be paid to the perimeter of the field and marrying in with existing or proposed hard surfaces or existing ground surface levels or swales.

3.3 PRIMARY SUBSOIL DRAINAGE INSTALLATION

Primary drainage installation shall follow topsoil placement, consolidation and trimming.

3.3.1 *Setting-out*

The Contractor shall not commence subsoil drainage works until a meeting has been held on site with the Engineer to verify the location of all proposed drain lines and outlet connections, and to discuss traffic management and stockpile locations. If the Contractor commences work in the absence of such a site

meeting, and the installation of works is subsequently found to be inaccurate, the Engineer may direct full re-instatement at the Contractor's expense. The Engineer's decision shall be final in this respect.

Note: the requirement in Section 1.7 for materials to be tested and approved two weeks prior to starting construction.

At the time of marking out the location of the SWMH connections, collector and lateral drain lines on the site, the Contractor shall confirm that all minimum grades, trench depths and connection to SWMHs can be achieved. Following the surface grade for the main collector drains shall not provide the required falls, therefore laser-guided trench excavation is required and manual checks of trench grade will still be required by the Contractor to ensure constant positive fall. Grades may be checked at random by the Engineer.

HOLD POINT 1 – Topsoil placement, initial levelling and drainage set out

3.3.2 *SWMH installation*

A new 1050mm chamber shall need to be installed as a replacement for the existing SW sump SW505680 as shown on Drawing 3262332-CE-1501 for the new outlet for the lower sports field. Two 1050mm storm water manholes shall also be required to be installed as part of the sports field drainage system on the lower field. All stormwater manholes and connections shall be installed adhering to Wellington Water-Regional Specifications for Water Services – July 2016.

Item	Detail
Diameter	3 no. at 1050mm
Depth	Depth sufficient to accommodate depth of pipe connections and silt trap
Silt trap	300mm in upgraded SW505680
Lids	Medium duty solid lid. The cast iron frame and cover may require adjustment rings to ensure the top of the lid finishes as per the plans.
Riser sections	The number of joints in the chamber shall be kept to a minimum by use of the maximum height of riser practicable. The maximum number of adjusting rings shall be two. Pre-cast sections shall be aligned to provide vertical sides
Joint seals	Joints between riser units and the lid section shall have cast rebated edges and sealed with bitumastic compound or similar approved material. All joints shall be constructed to ensure that they are watertight.
Connections	All connections into SWMHs shall be made by a registered drainlayer.
Relevant NZS	3107
Backfill	Filling around the chamber and to a depth of 300mm below the surrounding ground level shall be of selected material containing no vegetation, nor construction debris, and no stones above 26.5mm in size nor clay lumps larger than 75mm in size, compacted carefully in 150mm layers by means of a mechanical tamper or hand rammed as appropriate until the material is at least as dense as the surrounding ground. The final 300mm of backfill shall be original topsoil or approved topsoil (Section 2.4) and brought to the surface to finish flush with the manhole lid or surrounding surface levels.

3.3.3 150mm uPVC collector drain installation

3.3.3.1 Excavation

Trenches shall be excavated with vertical sides to take the collector drain pipe as appropriate.

Trench width shall be no more than 300 mm for 150mm uPVC collector drain pipe. Note that minimum trench width shall be such that the pipe falls freely into the trench without force being required.

Trench depth shall be a minimum of 575mm (allowing for 25mm bedding layer) at the grade indicated on the Drawings. Note one section of pipe on the lower field shall only have 350mm cover over the pipe and trench depth shall be approximately 500mm.

All excavated spoil shall be disposed off-site by the Contractor (see Section 1.4.3).

Trenching machinery capable of discharging spoil to a side conveyor belt is preferred. Following the surface shall not provide the required fall, therefore laser-guided trench excavation is required for all 150mm uPVC collector drain sections.

The base of the trench shall be cleared of all loose soil prior to pipe installation.

3.3.3.2 Pipe laying and outlet connection

The pipe shall be laid centrally in the trench to the tolerances specified. Pipe shall be jointed with EPDM elastomeric sealing rings in a socket push fit arrangement.

The outfalls of the 150mm uPVC collector drain pipe shall connect into the existing SWMH, as required. The pipe shall be installed at the appropriate height in the chamber and shall be fixed in a secure manner suitable for the purpose. Any debris falling into the chambers shall be removed.

A 25mm layer of approved angular gravel such as GAP7 shall be placed as a bed beneath the pipe.

3.3.3.3 Fittings

Purpose-built junction fittings shall be used to the 150mm uPVC collector drain and the lateral drains (e.g. 150 x 100 mm 45° reducing junctions). The fittings shall be installed progressively as the collector drain is completed. The exposed drain sockets shall be temporarily, but securely, sealed to prevent entry of surrounding soil, as approved by the Engineer.

A purpose built end cap shall be used on the top of each line.

3.3.3.4 Backfill

Trench backfill and surface reinstatement shall commence as soon as possible following laying and inspection by the Engineer.

Should any section of the 150mm uPVC collector drain be required to be left unfilled overnight, it shall be the Contractor's responsibility to temporarily fence off the drainage trench using high visibility fencing materials. The fencing shall be a minimum of 1.8 metre high at all points.

Backfill around the pipe shall be with GAP7 or other approved angular material, excavated material shall be placed to within 150mm of the surface. The pipe shall be held in place during the initial backfilling

phase to ensure the pipe is centrally located in the trench and that the desired gradient is retained. Excess material shall not be permitted to work under the pipe.

The final 150mm of backfill to the surface shall be of approved topsoil. The soil shall be consolidated by approved methods so that no subsequent settling occurs.

Backfilling around the pipe shall not cause displacement, deformation or excessive stress to the buried pipe.

All excavated spoil shall be disposed of off-site (see Section 1.4.3).

See Drawing 3262332-CE-3303 for drainage cross section details.

3.3.4 *Flushing point installation*

An inspection/flushing point shall be installed on each lateral drain within 1 metre of its connection to the collector drain as follows:

- The lateral drain shall connect to a vertically-directed 45° elbow.
- A length of 100 mm approved rigid solid walled pipe shall be glued to the elbow and then capped with an approved 110 mm threaded end cap such that the cap finishes no less than 250 mm below the finished field surface.
- A small metal plate (100 mm by 100 mm) shall be placed in the gravel backfill immediately over the threaded cap for future detection purposes.
- All nexus drain pipe shall be inserted and secured with a galvanised self-tapping screw into the purpose-built junctions.

All surfaces requiring gluing shall be first cleaned with a manufacturer's primer cleaner before gluing with a manufacturer's non-pressure solvent cement.

See Drawing 3262332-CE-3303 for more details.

3.3.5 *Lateral drain installation*

Perforated, smooth internal bore 110 mm lateral drain pipe shall be installed @ 7.5m centres unless otherwise indicated as per Drawings 3262332-CE-1401 & 3262332-CE-1501. A purpose built end cap shall be used at the end of each line.

3.3.5.1 *Excavation*

Trenches shall be excavated with vertical sides to take the 110 mm lateral drain pipe.

Trench width shall be a minimum of 140mm for the 110 mm pipe.

Trench depth shall be a minimum of 500 mm below the surface level and shall follow the surface grade.

All excavated spoil shall be disposed of on Site (see Section 1.4.3).

Trenching machinery capable of discharging spoil to a side conveyor belt is preferred.

Following the existing surface contours shall provide the minimum fall. Therefore, laser-guided trench excavation is optional.

The base of each trench shall be cleared of all loose soil prior to pipe installation.

3.3.5.2 Pipe laying and connection to collector drain

All lateral drain pipes shall be laid centrally in the trench lines to the tolerance specified with perforations facing upwards.

The lower end of each lateral drain shall be inserted and secured with a galvanised self-tapping screw into the purpose-built junction in the collector drain.

Any debris (including soil) in the trenches and at the point where the two trenches meet shall be removed by hand.

Only lengths of lateral drain that can reasonably be expected to be backfilled completely before the end of any one day shall be excavated at any one time.

Lateral pipe drain junctions shall be inspected by the Engineer prior to backfilling.

HOLD POINT 2 – Primary subsoil drainage installation

3.4 SOIL AMMENDMENT, BASE FERTILISERS & FINAL TRIM

The decision to apply base fertilisers (priced in provisional items) shall be made at the time of topsoil approval. Base fertilisers are to be applied with the final surface consolidated and trimmed prior to sowing. Provisional allowance shall be made for the supply and incorporation of approved compost should this be deemed necessary at time of topsoil placement.

3.4.1 Compost (provisional)

An even, 10mm layer of approved compost is to be supplied, applied and incorporated into the topsoil layer, prior to sowing. See Section 2.8 for compost specifications.

3.4.2 Base fertiliser application

Base fertilisers and amendments as confirmed by the Engineer are to be applied.

3.4.3 Cultivation

The base fertiliser(s) and compost (if deemed necessary) are to be cultivated into the top 100 mm with an approved implement such as a Harley rake, rotadairon or power harrow (Contractor is to allow for a minimum of three passes). A rotary hoe or planning type of implement shall not be acceptable.

3.4.4 Deep aeration of soil profile (provisional)

Upon completion of the topsoil installation and final trim/levelling it may deemed necessary for a verti-drain/ surface de-compaction to be carried out. This will assist in the relief of deeper profile compaction as a potential consequence of the earthworks. A decision as to whether or not this is carried out shall be made by the nominated turf specialist and the Engineer prior to the final trim.

3.4.5 *Final trim*

Upon completion of the surface cultivation, the surface is to be consolidated and laser trimmed to the design grades enduring that no soft spots are evident and the base fertilisers are evenly incorporated.

Final trimming, shall be achieved using a laser guided levelling device mounted on a suitable tractor (See Section 3.2.1) to produce an overall smooth surface over the entire area.

3.4.6 *Consolidation*

Upon completion of re-levelling the field, the cultivated material shall be sufficiently consolidated so that surface levels remain true.

The amount of consolidation required shall be determined on site by the Contractor with the agreement of the Engineer.

3.4.7 *Final trim completion standards*

The following standards must be achieved before levels are signed off:

- I. The finished surface shall be smooth and uniform and free of any obvious humps or hollows.
- II. At no point shall the deviation in surface level beneath a 3 m straight edge exceed 15 mm.
- III. Base fertilisers and compost have been evenly incorporated.
- IV. No wheel ruts deeper than 15 mm shall be visible over the main playing surface.
- V. The surface is evenly consolidated with no soft spots evident.
- VI. All traffic and surface damage has been repaired to the Engineer's satisfaction.

HOLD POINT 3 – Base fertilisers and final trim

4 Grassing and grow-in

Turf establishment and grow-in shall commence upon completion of all drainage, cultivation and trimming works.

4.1 SPRAYING OFF RE-GROWTH

If required, prior to seeding (provisional item), any re-growth since the initial levelling works shall be sprayed out using a registered spray contractor in accordance with NZS 8409:2004 Management of Agrichemicals (or subsequent editions) and relevant Council by-laws.

The following product shall be used in conjunction with a penetrant at label rates and applied at a medium to coarse droplet size.

Product	Rate
Glyphosate	4 L/ha

4.2 STARTER FERTILISATION

Prior to seeding, the entire sports field shall be fertilised using DAP at a rate of 250kg/ha.

Note: Starter fertiliser should be applied separately to base fertiliser.

4.3 SEEDING

The entire sports field platform area shall be sown as follows:

Species	Sowing rate (kg/ha)
Turf-type perennial ryegrass (80%), Brown-top bent grass (10%) Slender creeping fescue (10%).	400

Sowing will be completed by:

- i. Three passes using a dimple seeder or seed drill is the preferred method of sowing.
- ii. Alternative methods of sowing such as hydroseeding may be acceptable, but must be approved by the Engineer.

Upon completion, the sown area shall be rolled with a lightweight flat roller at the correct moisture level.

Seeding method and seed type is to be submitted to and confirmed by the Engineer prior to seeding.

HOLD POINT 4 – Seeding

4.4 GROW-IN

4.4.1 General

The Contractor shall be responsible for establishment and maintenance of the turfgrass sward as part of this Contract for **16 weeks**.

4.4.2 Reporting

The Contractor is to provide the Engineer (or its representative) with a regular (i.e. minimum weekly) update of all grow-in activities that have occurred following sowing. The report may be verbal or written and is to be communicated to the Engineer (or its representative). The report shall cover the previous 7-day period.

4.4.3 Irrigation

The Contractor is to carefully manage the irrigation throughout the 16 week period such that moisture levels remain optimum for rye grass establishment.

4.4.4 Mowing

Approximately four weeks after sowing, or when the grass reaches approx. 40 mm in height, the field shall be lightly rolled with a lightweight roller (less than 300 kg). The Contractor shall ensure that the surface of the field is dry before carrying out this operation to prevent caking on the roller.

Within two days of the rolling and provided the turf surface is dry, the turfgrass shall be mown with a sharp rotary mower set at 30 mm cutting height and clippings to be collected and disposed of at the Contractor's expense.

Thereafter, the Contractor shall mow the field as frequently as necessary to maintain a grass height of between 20 mm and 40 mm until handover. The Contractor is to expect a minimum of 2 mows per week during grow-in and the growing season and weekly mowing during winter months (June-Aug). Mowing shall be carried out using a sharp, well-adjusted rotary mower.

Mowing shall include the string trimming under any security fencing or signage or temporary irrigation system pipes installed by the Contractor to ensure the height of the grass does not exceed 50mm.

With the exception of the initial mow, where clippings are to be collected, mowing shall ensure that clippings are dispersed uniformly over the field with no clumps greater than 100mm in diameter.

4.4.5 Fertilising

The following fertiliser programme is suggested, but may be modified by the Contractor, subject to approval by the Engineer:

Apply Nitrophoska Blue [12-5-14] every 4-6 weeks at a rate of 150kg/ha (timing to be confirmed by the Engineer). A total of three applications are included in the schedule. **Note:** Because this is effectively an autumn/winter establishment caution is advised relating to the over-supply of Nitrogen to the fields. The negative impact of turf growing too fast during winter could be that ground conditions do not allow for regular mowing and the turf growth rate gets 'out of control'. Therefore a maximum of two applications of fertiliser is advised at a reduced rate of application, with allowance for a third application if conditions allow.

Fertiliser shall be applied prior to moderate rainfall events.

4.5 PROVISIONAL GROW-IN ITEMS

4.5.1 Broadleaf weed control

Up to two applications of Clopyralid (e.g. Versatill) at 1 L/ha for broad leaf weed control (or similar approved herbicide) shall be budgeted for to control broadleaf weeds during the grow-in period (i.e. up to Handover).

The timing of herbicide applications shall be as directed by the Engineer.

4.5.2 Spot soil top-dressing

During the grow-in, the Contractor is to allow for as a provisional item, the application of 5m³ of fine, processed, weed and stone free topsoil (see Section 2.4 for details) to address any minor depressions. Topsoil will be manually applied by hand in dry conditions and lightly raked or dragged into the turf surface. The need for this this application and the volume of material needed shall be confirmed on site between the Contractor and the Engineer.

4.6 ADDITIONAL SEEDING

As a provisional item, the Contractor shall include the cost to undersow an additional 200kg/ha of the turf seed blend detailed in Section 4.3 in two directions. The timing/need for additional seeding shall be confirmed between the Contractor and the Engineer.

4.7 SUPPLY AND INSTALLATION OF GOALS AND POST SLEEVES

All posts and goal posts sleeves required on site shall be supplied by others, however the contractor shall price to salvage, store and re install the existing rugby goal post sleeves.

4.8 HANDOVER

The following grow-in completion standards are expected to have been achieved:

Handover requirement	Standard	Measurement procedure
Turfgrass height	No greater than 40 mm	Glass prism
Presence of clippings	Uniformly dispersed No individual clumps	Visual Visual
Ground cover	≥ 90% ground cover with sown species ≤ 75 mm diameter patches of bare ground	Visual 0.5 m ² frame
Micro-levels	≤ 15 mm over 3 m	3 m straight edge
Broadleaf weeds	≤ 5% ground cover	Visual

Measurement of the standards outlined above shall be based on the field's general condition.

HOLD POINT 5 – Grow-in completion/handover

5 Hold Point Record and Details

5.1 Hold Point Record (excl. irrigation)

To be signed off by the Contractor, Engineer and Engineer's Representative.

Contract Name: XXXXX

Engineer: [insert name], [insert company]

Engineers Representative (1): [insert name], [insert company]

Engineers Representative (2): [insert name], [insert company]

The following are the stages of this contract where inspection is to be undertaken and this form signed off and dated:

Key Inspection/Hold Points	Signed and dated by: INSERT NAME (Contractor)	Signed and dated by: INSERT NAMES (Engineer's Rep)	Signed and dated by: INSERT NAME (Engineer)
1. General set-out and materials approval/topsoil placement and levelling			
2. Primary drainage installation			
3. Basal fertiliser application and final level			
4. Seeding (commencement of grow-in)			
5. Grow-in completion and field sign-off			

5.2 Hold Point Details

When Completed

1. General set-out and materials approval/topsoil placement and levelling

- Confirmation of Consent requirements and conditions.
- Confirmation of Consent related inspections
- Confirmation of sub-contractors to be used
- Confirmation of all contact points and lines of communication
- Confirmation of all materials to be used and their testing/approval
- Confirmation of location of Erosion and Sediment control measures and extent of works

- Confirmation of access/traffic routes
- Confirmation of stockpile locations, areas for storage sheds, plant and equipment etc
- Approval of topsoil quality and depth
- Approval of surface grades.
- Approval of mains, lateral drain and SWMHs locations.
- Agreement on trenching machinery and methodology.
- Identification of existing services and pipe work.
- Confirmation of silt control requirements

2. Primary drainage installation

- Approval of SWMH chamber materials and sizes.
- Approval of installation of new chambers.
- Approval of pipe connections to chambers.
- Approval of backfilling
- Approval of main drain trench dimensions.
- Approval of removal of loose spoil in base of trench and on surrounding surface.
- Approval of main drain pipe grades and backfilling methodology.
- Approval of main drain junction fittings and lateral drain sockets.
- Approval of silt trap/stormwater manhole chamber connections.
- Approval of backfilling procedures.
- Agreement of measurement of length of drains
- Approval of lateral drain trench dimensions, fall and depth.
- Approvals of removal of loose spoil in base of trench and on surrounding surface.
- Approval of lateral drain pipe material and placement.
- Approval of main drain junctions.
- Approval of lateral drain flushing points.
- Approval of backfilling procedures.

3. Basal fertiliser/compost application and final level

- Approval of fertiliser/compost type and incorporation
- Approval of application methodology and equipment
- Approval of final level field completion standards (Section 3.4.6).

4. Seeding

- Approval of grass seed type and certification
- Approval of sowing methodology and equipment

5. Grow-in completion

- Confirmation of receipt of grow-in reports.
- Confirmation of extra items carried out to achieve grow-in completion standards.
- Approval of field completion standards (Section 4.8).
- Confirmation of receipt of as-built data.(Section 1.8)