

# PARKS, SPORTS & RECREATION

## DESIGN STANDARDS FOR NATURAL TURF SPORTS FIELDS

(10 July 2013)

<b>Business Owner</b>	Sports Field Technical Work Group
<b>Project Sponsor</b>	Mark Bowater
<b>Business Unit/ Department/ Division</b>	Local and Sports Parks – Parks, Sport and Recreation
<b>Name/Path</b>	U:\COO\Parks Sports and Recreation\Local and Sports Parks\LSP West\5. Projects Contracts\3. Capex\PMO PMF Business Case - Sports Field Renewals.doc
<b>Version</b>	6
<b>Status</b>	Final
<b>Document Author</b>	Marke Jennings-Temple (on behalf of the Sports Field Technical Working Group)

## Table of Contents

<b>1.0</b>	<b>Introduction.....</b>	<b>4</b>
1.1	Introductory Statement .....	4
1.2	Note for Consultants .....	5
1.3	Typical upgrade process.....	5
1.4	General and Technical Specifications.....	6
1.5	Other Relevant Standards & Design Considerations .....	6
<b>2.0</b>	<b>Design Standards .....</b>	<b>7</b>
2.1	Primary Drainage.....	7
2.1.1	Installation sequence .....	7
2.1.2	Stormwater manholes (SWMHs).....	7
2.1.3	Main drains .....	8
2.1.4	Lateral drains .....	9
2.1.5	Flushing points.....	9
2.2	Secondary Drainage .....	10
2.2.1	Slit drains .....	10
2.2.2	Gravel bands.....	10
2.2.3	Alternative secondary drainage options .....	10
2.3	Catchment and Swale Drains .....	11
2.3.1	Catchment drains.....	11
2.3.2	Swale drains .....	11
2.4	Backfill Materials.....	11
2.4.1	Topdressing / sand carpet sand.....	11
2.4.2	Blinding sand .....	12
2.4.3	Gravel .....	12
2.4.4	Secondary drainage backfill .....	13
2.4.5	Topsoil .....	13
2.5	Sports Field Irrigation.....	13
2.5.1	Fittings for direct burial.....	13
2.5.2	Pipes and fittings.....	14
2.5.3	Solenoid control valves .....	14
2.5.4	Isolating valves .....	14
2.5.5	Sprinklers .....	15
2.5.6	Swing joints.....	15
2.5.7	Control cabling .....	15
2.5.8	Control equipment.....	16
2.5.9	Backflow prevention.....	16
2.5.10	Pressure testing .....	16
2.6	Cricket Pitches.....	17
2.6.1	Turf pitches .....	17
2.6.2	Concrete pitches .....	18
<b>3.0</b>	<b>Design Notes.....</b>	<b>19</b>
3.1	Erosion and Sediment Controls .....	19
3.2	Surface Removal and Relevelling.....	19
3.2.1	Spray out .....	19
3.2.2	Removal.....	19

3.2.3	Relevelling .....	19
3.3	Surface Reinstatement and Turfgrass Establishment.....	20
3.3.1	Sand carpet/sand layer establishment .....	20
3.3.2	Warm-season grass establishment by stolonising .....	21
3.3.3	Cool-season grass establishment from seed .....	22
3.3.4	Warm or cool-season grass establishment by turfing .....	22
<b>4.0</b>	<b>Quality Control .....</b>	<b>24</b>
4.1	Materials Testing .....	24
4.2	Hold Points .....	24
4.3	Completion Standards .....	24
4.4	As-Built Plans .....	24
<b>5.0</b>	<b>Appendices .....</b>	<b>24</b>
DS 1.1	– 600mm Ø SWMH	
DS 1.2	– 1050mm Ø SWMH	
DS 2.1	– Main Drain (150mm Ø non-perforated)	
DS 2.2	– Main Drain (160mm Ø perforated)	
DS 2.3	– Main Drain (225mm Ø non-perforated)	
DS 2.4	– Lateral Drains	
DS 2.5	– Flushing Point	
DS 3.1	– Slit Drains	
DS 3.2	– Gravel Bands	
DS 4.1	– Catchment Drains	
DS 4.2	– Swale Drains	
DS 5.1	– Natural Turf Cricket Block	
DS 5.2	– Concrete Cricket Pitch	

## 1.0 Introduction

### 1.1 Introductory Statement

As Auckland Council moves towards a Unitary Plan and a consistent approach and attitude towards the development of our open spaces for sport and recreation, it is clear that sports field renewal works and upgrades should be carried out using a consistent approach across the different regions of the city. The provision of high-quality winter sports surfaces is becoming increasingly important for Auckland. With limited land available for further purchase, we must maximise the usage potential of the natural turf sports fields that already exist. This document has two key purposes:

1. To provide the basis for a consistent approach when tendering for and carrying out sports field works in the Auckland region.
2. To indicate to contractors the minimum capabilities they must have if they are to offer specialist sports turf specific construction services to Auckland Council.

The Sports Field Capacity Development (SFCD) programme identified that 134 sports fields within the region could be upgraded to a slit drain-sand carpet system (see Fig. 1) and 66 fields could have improved drainage to help Auckland Council satisfy the shortfall in playing hours across the region.

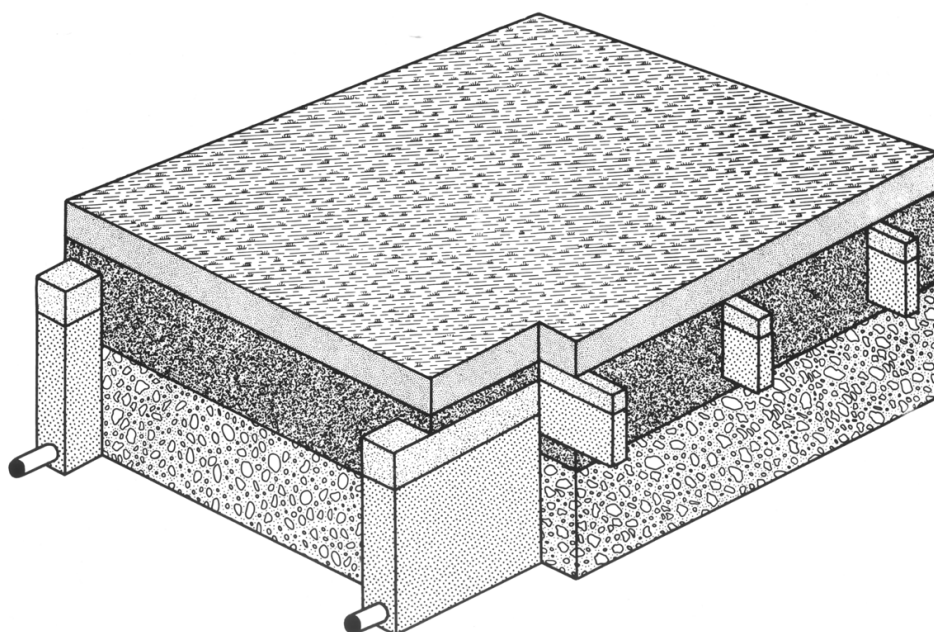


Figure 1: A slit drain-sand carpet drainage system. (Source: Adams, W and Gibbs, R [1994] *Natural Turf for Sport and Amenity: Science and Practice*. CAB International)

The SFCD specifically used slit drain-sand carpet systems stabilised using a warm-season turfgrass in its calculations and it is Auckland Council's intention that this internationally researched and widely accepted method of improving sports field performance continues. More importantly, is that the approach to slit drain-sand carpet sports field upgrades is carried out consistently across the region. It should also be noted that where a primary drainage system only is installed, it may be the pre-cursor to a full slit drain-sand carpet upgrade when budgets allow and therefore, all drainage shall be designed and installed with this in mind.

The key features of a typical slit drain-sand carpet system used in the SFCD calculations were as follows:

1. A laser-levelled surface
2. A primary drainage system of main and lateral drains that connect to a suitable outlet.
3. Slit drains installed perpendicular to the fall (where possible) and deep enough to provide adequate overlap/connection between the permeable backfill of the lateral drains and the permeable backfill of the slit drains.
4. A sand carpet depth of at least 50mm to protect the top of the slit drains and aid water flow towards the slits. Note that the sand carpet is a true drainage layer and the 50mm depth should be considered a minimum.
5. The sand carpet stabilised with a warm season turfgrass.

These Design Standards are to assist and guide the development of slit drain-sand carpet sports fields in the Auckland Region. Sports fields are to be designed and built such that they have a long lifespan and help meet the targets of the SFCD programme.

Contractors should note that Auckland Council engages with specialist turf consultants to investigate the condition of existing fields and then to design appropriate improvement works. As a result, site-specific factors may result in a deviation from all or any of the Design Standards presented in Section 2 of this document. All deviations from the Standards in this document will be clearly articulated in the tender specifications for a particular project.

## **1.2 Note for Consultants**

Auckland Council recognises that there are a wide range of site-specific factors that may result in deviation from the Design Standards and Design Notes presented in this document. Consultants shall work closely with the relevant Sports Turf Advisor and/or business owner from Auckland Council to ensure that site specific constraints and issues have been clearly identified during the site investigation phase of the works. Justifications for deviation from the Design Standards and/or Design Notes presented in this document shall be signed off by all stakeholders prior to tendering works and then included in summary in the tender documentation.

## **1.3 Typical upgrade process**

The following is a summary of the typical works that may occur during the upgrade of winter sports fields. Where a Design Standard exists it is referred to in the list below (Section 2). Where Design Notes exist to assist with interpretation and to clarify requirements, they are also referred to (Section 3).

- Fence site
- Install erosion and sediment controls (Section 3.1)
- Spray out surface (Section 3.2.1)
- Surface removal (Section 3.2.2)
- Relevelling (Section 3.2.3)
- Installation of primary drainage (Section 2.1)
- Installation of secondary drainage (Section 2.2)
- Installation of catchment and/or swale drains (Section 2.3)
- Installation of an irrigation system (Section 2.5)
- Installation of cricket pitch (Section 2.6)

- Sand carpet installation (Section 3.3.1)
- Turfgrass establishment & grow-in (Sections 3.3.2 – 3.3.4)

## **1.4 General and Technical Specifications**

A General Specifications and Technical Specifications template has been prepared that Consultants engaged by Auckland Council are required to use when working on sports field development projects and preparing tender documents. It uses these Design Standards and Design Notes as the basis for providing detailed sports field upgrade requirements in an editable and customisable format. Smaller projects that do not require a full tender shall still reference these Design Standards and Design Notes where appropriate. Industry-specific technical knowledge shall be used in conjunction with these Design Standards and Design Notes to ensure that industry best-practice, typical industry machinery and experienced contractors can follow the specification documents and achieve the desired end result for Council.

- General Specifications shall incorporate site investigation information, background information and information on general expectations such as spoil disposal, quality control procedures and as-built plans.
- Technical Specifications shall detail the proposed works such that Contractors can ascertain the full extent of the works and price the works accordingly and shall be based on the Design Standards. The specifications shall include a summary of all deviations from the Design Standards.

## **1.5 Other Relevant Standards & Design Considerations**

During the design process, consultants are to ensure that the proposed works meet the requirements of the following standards and council values where appropriate:

- The Building Act 2004 and New Zealand Building Code.
- NZS 4121:2001 Design for Access and Mobility.
- The National Environmental Standards for Assessing and managing Contaminants in Soil to Protect Human Health.
- Auckland Council's Draft Sports Field Development Specifications.
- Relevant Council Code of Practice specifications where they exist.
- The use of sustainable materials during construction.
- To meet all safety requirements.
- To reduce graffiti and vandalism potential, future maintenance and improve safety.
- All relevant Auckland Council park strategies, Reserve Management Plans, existing concept or development plans, Code of Practice and Safety Design Guidelines and principles of Crime Prevention through Environmental Design (CPTED).
- Consideration regarding access for older adults, the disabled and children.
- All primary walkways must be 1:12 grade to allow wheelchair access, all secondary walkways must be no greater than 1:6, if steeper then steps are required.
- HS262 – Auckland Council Minimum Health and Safety Requirements for Contractors

## 2.0 Design Standards

### 2.1 Primary Drainage

#### 2.1.1 Installation sequence

Unless otherwise agreed with the Engineer (or its representative), drainage works shall be installed in the following order:

- Install new stormwater manholes (SWMHs) and connect to existing stormwater system
- Install main drain and connect to new/existing stormwater manholes
- Install lateral drains and connect to new main drain
- Install inspection/flushing points with lateral drains

#### 2.1.2 Stormwater manholes (SWMHs)

Item	Detail
Diameter	600mm or 1050mm
Depth	Depth sufficient to accommodate depth of pipe connections and silt trap (note max. depth for 600 mm chamber is 1.2m)
Silt trap	300mm (600mm Ø chamber) or 500mm (1050mm Ø chamber)
½ syphon	All manholes or cesspits with an open grate designed to intercept surface water must have a ½ syphon on the outlet pipe. In addition, all outlets from sports field drainage manhole(s) that connect into an existing SWMH must also have a ½ syphon, irrespective of whether it has an open grate or not.
Base type	The base of the chamber shall be cast in-situ using 17.5 MPa concrete. The manhole risers shall be lowered into the base concrete and the concrete neatly trowelled to a 45° finish at least 150mm up the outside of the riser. Alternatively a precast flanged base section may be used and set on a bedding of Normal Grade concrete. Flanged base sections shall be precast to NZS 3107.
Lids	Medium-duty cast iron frame and manhole lids (or grates as appropriate) shall be used. The cast iron frame and cover may require adjustment rings to ensure the top of the lid finishes as per the plans. Manhole lids shall be manufactured in accordance with NZS 3107.
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	Where sides or tops of existing manholes are to be broken into to accommodate new pipes, broken edges shall be carefully repaired with cement mortar or epoxy mortar to a good standard of finish, and to maintain the manhole leakproof. All connections to be made by a registered drain layer
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 approved topsoil and brought to the surface to finish flush with the manhole lid.
----------	---

Specifications for SWMH installation and connections shall relate to current Auckland Council Standards for Engineering Design and Construction.

### 2.1.3 Main drains

#### 150mm Ø non-perforated

Item	Detail
Pipe	uPVC stormwater pipe, SN4
Diameter	150mm (note that installation grades shallower than 1% may necessitate the use of a larger diameter pipe to ensure adequate flow rates depending on run-lengths)
Type	Solid walled (smooth)
Pipe grade	Minimum: 1%
Fittings	Purpose made end caps & 150mm x 100mm 45° reducing junctions for lateral drain connections
Relevant NZS.	NZS 1260
Trench width	Maximum 320mm
Trench depth	Minimum 625mm depth from surface
Pipe bedding	25mm layer of SAP7 (or other approved angular material)
Backfill around pipe	SAP7 (or other approved angular material)
Backfill material	Spoil from excavation to 150mm from surrounding surface (if suitable). Final 150mm to be approved quality topsoil.

#### 160mm Ø perforated

Item	Detail
Pipe	Double wall polyethylene
Diameter	160mm
Type	Corrugated, perforated, internal smooth bore
Pipe grade	Minimum: 1%
Fittings	Purpose made end caps & 150mm x 100mm 45° reducing junctions for lateral drain connections
Relevant NZS.	-
Trench width	Maximum 320mm
Trench depth	Minimum 625mm depth from surface
Pipe bedding	25mm layer of SAP7 (or other approved angular material)
Backfill material	Approved gravel to 200mm from surrounding surface. Then 50mm blinding sand & final 150mm to be approved quality topsoil.

Note: a catchment drain may also be used as a main drain (see Section 2.3.2)



225mm Ø non-perforated

Item	Detail
Pipe	uPVC stormwater pipe, SN4
Diameter	225mm
Type	Solid walled (smooth)
Pipe grade	Minimum: 1%
Fittings	Purpose made end caps & reducing junctions for lateral drain connections
Relevant NZS.	NZS 1260
Trench width	Maximum 420mm
Trench depth	Minimum 700mm depth from surface
Pipe bedding	25mm layer of SAP7 (or other approved angular material)
Backfill around pipe	SAP7 (or other approved angular material)
Backfill material	Spoil from excavation to 150mm from surrounding surface (if suitable). Final 150mm to be approved quality topsoil.

**2.1.4 Lateral drains**

Item	Detail
Pipe	Double wall polyethylene
Diameter	110mm
Type	Corrugated, perforated, internal smooth bore
Pipe grade	Consistent, minimum grade: 0.4%
Fittings	Purpose made end caps & 110mm x 110mm in-line couplers for connecting sections of pipe as necessary
Relevant NZS.	-
Trench width	Minimum 135mm
Trench depth	Minimum 500mm depth from surface
Backfill material	Approved gravel to 150mm from surrounding surface. 50mm blinding sand & final 100mm of approved quality topsoil.

**2.1.5 Flushing points**

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

- The lateral drain shall connect to a section of rigid, solid-walled 100mm uPVC pipe over which a clay bung shall be installed signalling the outside edge of the drainage system and preventing water seepage from the lateral drain trench into the main drain trench. The clay bung is to be installed in 150mm (maximum) layers and compacted to match the density of surrounding soils. The clay is to be brought to 100mm from the surrounding soil surface and completed with topsoil. The bung shall be 300-400mm in length. Care must be taken to prevent excess clay being worked under the pipe.
- The 100mm uPVC section shall connect to a vertically-directed 45° elbow.
- A length of 100mm uPVC pipe shall be glued to the elbow and then capped with a 100mm threaded uPVC end cap such that the cap finishes 250mm below the finished field surface.
- A small metal plate (100mm by 100mm) shall be placed in gravel backfill immediately over the threaded cap for future detection purposes.

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

## 2.2 Secondary Drainage

Auckland Council recognises that there is an increasing array of secondary drainage options available. However, only one has been included in the SFCD programme (slit drains) while another (gravel bands) is considered viable for temporary or short-term works due to its extensive overlap with the lateral drain backfill. Wherever possible, Auckland Council prefers that slit drains are installed.

### 2.2.1 Slit drains

Item	Detail
Spacing	Typically 1m
Trench width	50mm
Trench depth	300mm
Back-fill material	200mm approved gravel & 100mm blinding sand to the surface

Where slit drains are specified, a minimum sand carpet depth of 50mm must also be specified.

### 2.2.2 Gravel bands

Item	Detail
Spacing	Typically 0.4m
Trench width	25mm
Trench depth	350mm
Back-fill material	Approved gravel banding backfill

Notes:

1. Gravel band systems have not been used in the Auckland Council SFCD and are not considered suitable for use in slit drain sand carpet upgrades. However, where site specific factors require them to be installed, a minimum sand carpet depth of 50mm must be specified.
2. Where gravel bands are installed to provide short-term drainage improvements, a 20mm sand layer over the bands must be specified to protect them from being capped with soil during field use.

Please also note the differing terminology: a sand carpet is a true drainage layer and is to be a minimum of 50mm thickness. A sand layer of 20mm is not a true drainage layer and is only to protect the top of the gravel bands from being capped with soil during use.

### 2.2.3 Alternative secondary drainage options

Auckland Council's Sports Field Technical Working Group is aware that alternative secondary drainage options to those presented in Sections 2.2.1 and 2.2.2 are available in New Zealand and is currently assessing their suitability for use in slit drain-sand carpet upgrades. As alternative options are accepted for use by Auckland Council, this section of the Design Standards and the Drawings shall be updated.

## 2.3 Catchment and Swale Drains

Swale drains for sports field applications are not intended as stormwater treatment swales as per the definition in TP108. Instead, they are intended only to concentrate surface water flow and convey surface water towards a suitable outlet or act as a catchment drain with permeable backfill. Where swale-type drains are proposed, they are to satisfy the following criteria:

### 2.3.1 Catchment drains

Item	Detail
Total swale width	3m
Swale depth	550mm Min. (110mm Ø pipe); 600mm Min. (160mm Ø pipe)
Swale grade	N/A
Swale sides	Max. 1 in 4
Pipe type	110mm Ø or 160mm Ø perforated, corrugated, smooth bore
Pipe grade	Consistent, minimum grade: 0.3%
Backfill	Geotextile wrapped gravel (200mm) then a further 50mm gravel layer. Balance of trench; SAP7 scoria.
Grass type	Turfgrass turf, preferably established using sand-based warm-season turf for rapid stabilisation of the swale

### 2.3.2 Swale drains

Item	Detail
Total swale width	3m
Swale grade	0.3% minimum
Swale sides	Max. 1 in 4
Grass type	Turfgrass turf, preferably established using warm-season turf for rapid stabilisation of the swale

Note that total swale width may need to increase as the swale gets deeper, in order to maintain the 1 in 4 slope sides.

## 2.4 Backfill Materials

### 2.4.1 Topdressing / sand carpet sand

Topdressing sand shall meet the following criteria:

- There shall be less than 0.5% calcium carbonate (lime) present.

The particle size distribution shall be:

Particle size (mm)	% passing
8.0	100
4.0	100
2.0	100
1.0	90-100
0.50	35-90

0.25	0-50
0.125	0-2
0.063	0-1

Notes:

1. For new constructions, sand may be used that has a calcium carbonate content greater than 0.5%.
2. Topdressing of an existing field that already has a low calcium carbonate content sand carpet installed is only to be carried out with a low calcium carbonate content sand (i.e. less than 0.5%).

### 2.4.2 Blinding sand

Material used where blinding sand has been specified shall meet the following criteria:

- There shall be less than 5% calcium carbonate (lime) present.
- There shall be less than 10% pumice.

The particle size distribution shall be:

Particle size (mm)	% passing
8.0	98-100
4.0	92-100
2.0	75-100
1.0	50-95
0.50	10-60
0.25	0-20
0.125	0-2
0.063	0-1

### 2.4.3 Gravel

Material used where gravel has been specified shall meet the following criteria:

- There shall be less than 1% calcium carbonate (lime) present.
- There shall be less than 10% pumice.

The particle size distribution shall be:

Particle size (mm)	% passing
16	100
8	95 – 100
4	15 – 35
2	0 – 6
1	0 – 1

#### 2.4.4 Secondary drainage backfill

- Slit drains

Slit drain backfill shall be 200mm of approved gravel (Section 2.4.3) overlain by 100mm blinding sand (Section 2.4.2).

- Gravel Bands

Gravel banding gravel shall meet the following criteria:

Particle size (mm)	% passing
8	100
4	95 – 100
2	15 – 30
1	0 – 5

#### 2.4.5 Topsoil

Topsoil shall 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 a 12mm maximum aggregate size. It shall not contain any foreign matter such as glass, wood, concrete, steel, clay lumps, tree roots or other undecomposed plant remains.

The topsoil shall not contain any more than 25% clay and no more than 50% sand.

It should also be noted that it may be a requirement to demonstrate that any imported soil (topsoil and clay) meets MfE cleanfill criteria.

### 2.5 Sports Field Irrigation

Auckland Council engages specialist sports turf irrigation engineers to design sports field irrigation systems. The design brief for consultants, and performance requirements that the final system is expected to achieve, includes the following:

- Distribution Uniformity (DU) 80%
- Scheduling Coefficient (SC) 1.3
- Mean Precipitation Rate 11mm to 15mm per hour

All performance figures shall be achieved while operating the sprinklers within the manufacturers' recommended pressure range.

#### 2.5.1 Fittings for direct burial

Only Teflon-coated stainless steel nuts, bolts, washers and threads or galvanised (not electro-plated) nuts, bolts, washers and threads are to be used on all fittings.

## 2.5.2 Pipes and fittings

Item	Detail
Pipe grade	All mainline pipe to be PN12 rated and sub-main pipe to be PN9, conforming to AS/NZS 1477 for uPVC and AS/NZS 4130 for MDPE
Pipe depth	Pipe depth shall be sufficient to ensure 400mm cover at all times
Mainline criteria	Maximum water velocity: 1.5 ms <sup>-1</sup> Maximum pressure loss: 100 kpa
Sub-main criteria	Maximum water velocity: 2.0 ms <sup>-1</sup> Maximum pressure variation: 10% along its length
Joining criteria	All uPVC pipes 65mm in diameter and above are to use rubber ring joints
Pipe fittings	All pipe fittings to be minimum PN15 (1500 kpa) rated.
Thrust blocks	On pipeline sections with rubber ring joints, thrust blocks must be installed at all places where there is a change in pipe direction. Thrust blocks must be installed in accordance with NZS 7643:1979.
Backfilling	Backfilling shall be placed initially as a 200mm layer and compacted by foot tamping. After this, the balance of the trench shall be backfilled and consolidated such that no further settlement occurs. The final 150mm shall be approved quality topsoil.

## 2.5.3 Solenoid control valves

Item	Detail
Minimum operating pressure	1400 kPa
Max. pressure loss	25 kPa
Physical requirements	Flow control. Internal bleed manual control. Valve bonnet to be secured with stainless steel nuts. Industry standard 24VAC 2-watt solenoid.

## 2.5.4 Isolating valves

All isolating valves must have a minimum PN16 rating.

### Lateral isolation

Isolating valves shall be either brass gate valves suitable for in-ground service, or Philmac Nyglas plastic ball valves. The use of ball valves and wafer butterfly valves with levers is not permitted.

### Mainline isolation

Mainline valves are to be resilient wedge gate, sluice or butterfly valves. All mainline valves must incorporate a handle to allow valve operation without specialist tools. The use of ball valves and wafer butterfly valves with levers is not permitted.

#### Ball valves

A 25mm ball valve (pressure test point) is to be installed where appropriate.

#### Quick coupling valves

Where required quick-coupling valves shall be 25mm brass quick-coupling valves compatible with Harvin #5 keys.

Quick-coupling valves will be connected to the mainline pipe by swing joints and secured by means of a stabiliser bracket. Quick-coupling valves shall be installed in 150mm round valve boxes and include stabiliser brackets and swing joints.

### **2.5.5 Sprinklers**

Item	Detail
Design operating pressure	Ideal operating pressure: 500 kpa (70psi) Minimum operating pressure: 450 kpa
Design radius of throw	Shall be 0.5m greater than sprinkler spacing
Coefficient of Uniformity	Minimum Coefficient of Uniformity: 80% Scheduling Coefficient: 1.3
Physical requirements	25mm BSP sprinkler inlet Minimum of 100mm pop-up height Exposed diameter less than 75mm with a rubber cover Stainless steel sheathed riser stem Low head drainage valve Full range of interchangeable nozzles Part circle versions, if applicable, to have adjustable arc settings Minimum three-year warranty

### **2.5.6 Swing joints**

All swing joints shall be:

- High pressure with double O-ring
- 25mm diameter with BSP thread
- Minimum riser length of 300mm

### **2.5.7 Control cabling**

All control cabling shall be polyethylene sheathed and suitable for direct burial (i.e. Tyflo WSE1705 or equivalent).

- A minimum conductor size of 1.5mm<sup>2</sup> shall be utilised.
- No cable joints are acceptable between control valve and the controller.

- All cable connections shall be made with 3M-DBY waterproof connectors or equivalent.
- All cable under sealed paths or roadways shall be housed in conduit.
- A 500mm loop of cable shall be provided at each valve box.
- Cable shall be bundled and secured every 5m and laid underneath the pipework. If no pipework is present, then cables shall be buried to 450mm depth, 100mm below electrical warning tape.

### 2.5.8 Control equipment

Item	Detail
Controller	<p>The controller shall be fitted with at least one more module than the minimum number of stations in the design and able to operate at least two stations and the master valve concurrently.</p> <p>The controller shall have a minimum of three independent programs, a 14-day calendar or interval schedule, and incorporate a sprinkler test cycle and a water budgeting feature.</p>
Rain switch	Only a rain switch with an adjustable rate of evaporation is to be used. Installation is to be on the roof of a nearby building i.e. pump shed or club rooms, etc. Preference shall be given to wireless rain switches.
Cabinet	<p>The controller shall be housed in a vandal-resistant cabinet, Montrose AB1 or approved equivalent, mounted on a galvanised iron pole at eye level or attached to a nearby building if possible (i.e. a Council asset).</p> <p>All cables shall enter the cabinet from the base, and shall be housed in galvanised iron conduit where they run above ground. All cabling below ground shall be in conduit.</p>

### 2.5.9 Backflow prevention

A testable double-check backflow prevention device, complete with isolation valves and line strainer, shall be installed at the point of connection.

The backflow preventer is required to be installed in a lockable PK45 (or equivalent) oversize metal valve box (steel or aluminium), with appropriate support.

### 2.5.10 Pressure testing

Before accepting as complete, Auckland Council (or its agent) shall undertake pressure testing of the completed irrigation system. One of the following tests shall be carried out:

Pipe type	Test detail
uPVC	<p>The pressure test shall conform to Section 9.3.2.3 of NZS7643: 1979 where a test pressure of 10 bar is applied.</p> <p>The maximum pressure drop allowable is 10% of the test</p>



	<p>pressure per hour.</p> <p>All mainline pipe is to be tested to 1200 kpa. To pass the test a pressure of greater than 1100 kpa must be present after 60 minutes.</p>
MDPE	<p>a) Ensure pipe is adequately anchored</p> <p>b) Remove all air from the pipeline</p> <p>c) Pressurise the pipe at 1200 kPa, and maintain the pressure at that level for 30 minutes by additional pumping as required. Inspect for leaks.</p> <p>d) Rapidly reduce the pressure by bleeding water from the system down to nominal 200 kPa at the test gauge.</p> <p>e) Isolate the installation again.</p> <p>f) Record the pressure reading over the following intervals:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Between 0 &amp; 10 minutes, record pressure every two minutes</li> <li><input type="checkbox"/> Between 10 &amp; 30 minutes, record pressure every five minutes</li> <li><input type="checkbox"/> Between 30 &amp; 90 minutes, record pressure every ten minutes</li> </ul> <p>The pressure reading will rise due to the contraction of the pipe once the pressure is reduced to 200 kPa. It will then level off. If it falls after levelling off there is a leak within the system and the pressure test fails.</p>

## 2.6 Cricket Pitches

### 2.6.1 Turf pitches

Item	Details
Base material	SAP7 scoria
Base material depth	150mm (compacted) with geotextile between layers
Clay type	Patumahoe Clay
Clay depth	125-150mm (compacted i.e. ready for play)
Surface grade	0.25-0.75% in any direction
Block drainage	300 x 50 flat pipe or 110mm Ø corrugated plastic, internal smooth bore pipe connecting into the sports field drainage system
Construction notes	<ul style="list-style-type: none"> <li>• Blocks made up of multiple pitches can fall in one direction or the block may be split and fall in two directions depending on surrounding surface levels.</li> <li>• Where a block is made up of individual pitches, a change in gradient is only permitted between pitches and not within a pitch.</li> <li>• Irrespective of fall, the depth of each layer is to remain consistent and the base shall be shaped to match the final surface shape with drainage installed in the lowest point of the base.</li> <li>• The pitch or block is to be boxed to its full depth to permit adequate compaction of both layers during construction.</li> </ul>

	<ul style="list-style-type: none"> <li>• Final block height shall be 50mm higher than the final height of the surrounding sports field (after all sand applications). Soil or sand as appropriate is to be used to marry in the block with the sports field.</li> <li>• Run-ups may be drained and/or a ring-drain may be installed around the block using the Standard Design details for lateral drains (Section 2.1.4).</li> </ul>
--	---

## 2.6.2 Concrete pitches

Non-premier concrete pitches shall be constructed as per the Auckland Cricket Association specifications, as follows:

Item	Details
Pitch length	25m (up to 30m is acceptable)
Pitch width	2.64m (up to 2.7m is acceptable)
Base material	SAP 7 scoria
Base material depth	50mm (compacted)
Concrete type	20 mPa, 19mm aggregate with 665 reinforcing mesh or Fibremesh 150
Concrete thickness	100mm
Surface grade	12mm cross fall
Artificial grass surface	TigerTurf Deluxe or Premier or equivalent

## **3.0 Design Notes**

The purpose of this section is to provide suppliers and potential suppliers to the sports turf industry with additional information regarding the nature of the works involved and Auckland Council's expectation. This section is not considered a design standard but instead reflects the detail that will be found in the specification documentation.

### **3.1 Erosion and Sediment Controls**

A Sediment Control Management Plan (SCMP) may be required for Building and Resource Consents. Where an SCMP is required, all controls shall be designed to TP90 requirements, unless sediment control socks are being used (not currently in TP90). All erosion and sediment controls shall be designed to:

- Prevent clean water accessing the site
- Prevent sediment laden water exiting the site
- Protect cesspits and SWMHs with grated lids from sedimentation
- Protect the site entranceway that is likely to receive concentrated traffic

All controls must be installed prior to physical works commencing.

### **3.2 Surface Removal and Relevelling**

#### **3.2.1 Spray out**

The surface that is to be removed shall first be sprayed out using a tank mix of appropriate herbicides to achieve die-off of the species present prior to the works (unless the park is located in a no-spray zone).

GROWSAFE practices for safe handling of potentially hazardous chemicals are to be employed at all times.

Note that spraying is to occur at least 2-weeks prior to surface removal.

#### **3.2.2 Removal**

Where specified, surface removal is to be carried out to a depth determined by the consultant during the site investigation phase. Only turf-specific machinery capable of discharging directly into an adjacent vehicle shall be permitted to carry out this operation. The use of self-propelled, motor scrapers is not permitted.

Appropriate machinery includes, but is not necessarily limited to, the Koro Field Topmaker.

#### **3.2.3 Relevelling**

It is the preference of Auckland Council that all fields are laser-levelled and that surface smoothing operations also utilise laser-guided equipment. Re-levelling the field may take place after or before installation of primary drainage and irrigation. However, the following must be ensured:

- The cover over existing irrigation pipes remains at least 400mm, and;
- The amount of topsoil backfill over existing lateral and main drain pipes remains no less than 75mm and 100mm respectively.

If it exists, the existing irrigation may be required for dust control and management of soil moisture content during re-levelling.

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 pressure, rather than conventional tyres. A road grader or other heavy rubber tyred machine shall not be acceptable for working on the surface.

Preference may be given to machinery that both cultivates and re-levels the surface in one operation to minimise traffic on the surface and reduce dust generation.

### 3.3 Surface Reinstatement and Turfgrass Establishment

#### 3.3.1 Sand carpet/sand layer establishment

Where specified, the sand carpet or sand layer shall be as follows:

Item	Detail
Material	See Section 2.4.1
Depth	50mm Min. (sand carpet) / 20mm (sand layer)
Installation methodology notes	<ul style="list-style-type: none"> <li>• Sand carpet installation may occur prior to or following slit drain installation and turfgrass establishment but must be completed throughout the grow-in phase prior to field opening.</li> <li>• Contractors should anticipate carrying out a number of applications during the grow-in phase to achieve the desired final sand carpet depth.</li> <li>• A continuous belt drop spreader is the preferred method of sand application due to its accuracy. Use of a lime spreader to apply sand is at the discretion of Auckland Council. All powered machinery shall be fitted with appropriate turf-type tyres.</li> <li>• The surface of the field shall be dry enough to ensure uniform sand spreading without risk of wheel rutting. All stages of sand application shall be carried out in warm, calm conditions to minimise loss of sand by wind blow.</li> <li>• Where gravel bands are installed, sand layer installation shall occur immediately following their installation (also see Section 2.2.2).</li> </ul>

### **3.3.2 Warm-season grass establishment by stolonising**

It is the preference of Auckland Council's Sports Field Technical Working Group that warm-season grasses are used on all slit drain-sand carpet upgrades and renewals. Council will liaise with consultants on a case-by-case project to select the most appropriate warm-season grass. Dual-species systems that use warm and cool-season grasses will also be considered on a case-by-case basis.

Where specified in the tender documentation, warm season grass establishment shall occur as follows:

#### **3.3.2.1 Harvest**

- The warm-season grass shall have been regularly cut at height of 25mm regularly prior to harvest. Broadleaf weed and grass weed content shall be 0% at the time of inspection.
- The stolons shall be harvested using an approved method, such that stolons are predominantly 50-150mm in length, with clumps of stolons no greater than 150mm in diameter.
- There shall be minimal soil contamination of harvested stolons. Minimal means less than 5% by volume of the bulk stockpile of stolons.
- Suitable harvesting techniques include the use of a turf cutter (followed by shredding of the turf rolls) or a Koro Field Topmaker using planning blades (not scarifying blades).
- Use of scarifying blades to harvest stolons shall not be acceptable unless the proposed machinery has been agreed by prior arrangement with the Engineer (or its representative). Should scarifying blades be considered acceptable by the Engineer (or its representative), the Contractor will be required to supply stolons on a volume basis as specified by the Engineer (or its representative).

Contractors should note that an independent turf consultant shall be visiting the turf farm or donor site prior to harvest to approve the turf area for harvest.

#### **3.3.2.2 Supply**

Approved warm-season grass types and varieties will include those that have an established track record of use for winter games pitches in the greater Auckland region.

The Contractor must provide a guarantee that the stolons will be harvested, delivered and planted within a 24 hour period.

Upon stolon delivery to the project site, Chain of Custody documentation is to be supplied to the Engineer (or its representative) by the Contractor that includes:

- Date of turf farm or donor site inspection by independent assessor
- Time and date of stolon harvest
- Transport time
- Time and date of delivery

### 3.3.2.3 Stolonising

Note that stolon planting shall be required to take place as soon after delivery as possible. At no stage during harvesting, transporting or planting shall stolons be allowed to dry out.

Stolonising shall be carried out under appropriate weather conditions. This will require the Contractor to study the weather forecast during the proposed period of harvest, delivery and stolonising and obtain agreement from the Engineer (or its representative) that harvest can proceed.

The entire sand carpet layer shall be moist prior to, during and after stolonising. Accurate irrigation scheduling will be required for this purpose. Saturated and soft ground conditions must be avoided.

Stolonising shall occur during the early-to-mid morning period (7 am to 11 am) when maximum day temperatures have not been reached and when wind conditions are more likely to be reduced. Transportation and delivery of stolons shall not occur during the hottest part of the day.

### 3.3.3 Cool-season grass establishment from seed

If turfgrass establishment from seed is specified, details such as the following shall apply:

- Only winter-active turf-type ryegrass cultivars or fescue types shall be accepted by Council
- Typical application rates are 300 kg/ha, applied as follows:
  - A portion of the seed (i.e. 50%) shall oversown
  - The remaining portion shall be undersown
- Seed attributes are to meet the following minimum standards;
  - Endophyte Rating: 70% minimum
  - Purity: 99% minimum
  - Germination score: 90% minimum
  - Certificates of purity and germination are to be supplied. For seed produced in excess of 12 months prior to the time of sowing on the project site, it shall have been retested within three months of supply.

### 3.3.4 Warm or cool-season grass establishment by turfing

Where specified, sports field establishment by instant turf shall meet the following criteria:

- The turf shall be grown in the same rootzone material used for the sand carpet application. In this respect, 'same' means a similar particle size distribution which is hydrologically compatible with the underlying sand carpet.
- Turf strength and levels shall be sufficient to enable harvesting to a uniform depth, followed by transport and laying without deterioration.
- Turf shall be supplied in a medium compatible with the sand carpet to a minimum installation depth of 20mm.
- Turf harvesting may be in either big roll or conventional format.
- Upon completion of turfing, the entire turfed area shall be lightly topdressed with approved rootzone sand (equivalent to approx. 2mm depth over the sand carpeted area) and flat rolled.

- The turf surface, once laid, shall be a complete, healthy and uniform cover over the sand carpeted area with no bare areas or sign of desiccation visible.

## **4.0 Quality Control**

Auckland Council shall use the following to ensure that quality standards are maintained and the relevant Design Standards are adhered to throughout the physical works.

### **4.1 Materials Testing**

Only clean, contamination-free materials shall be used for the works. Topsoil, gravel and sand specified for the works is required to be analysed for suitability and approved prior to the commencement of work. Representative samples (min. 1kg or 1 L) are to be submitted to an approved testing laboratory by the Contractor at least 2-weeks prior to works commencing with results presented to the Engineer (or its representative) at the pre-commencement meeting.

### **4.2 Hold Points**

Hold points shall be specified at appropriate times during the course of the works. The contractor shall not continue with the next stage of the works until each appropriate hold point has been signed off by the Engineer (or its representative).

Hold Points shall be placed at any relevant point in the specification documents.

### **4.3 Completion Standards**

At the end of each phase of works, Completion Standards shall be used by the Engineer (or its representative) to sign-off the completed works. The specification documents shall include Completion Standards for each phase of work and shall be customised by the consultant to the site-specific works being undertaken.

### **4.4 As-Built Plans**

The Contractor shall be responsible for recording the positions of all services installed on site and all work undertaken as part of this Contract during the Works. At the conclusion of the Works, this information shall be supplied to the Engineer (or its representative) in the form of an as-built drawing.

The specification template provides information surrounding as built requirements.

## **5.0 Appendices**

Design Standard drawings:

- DS 1.1 – 600mm Ø SWMH
- DS 1.2 – 1050mm Ø SWMH
- DS 2.1 – Main Drain (150mm Ø non-perforated)
- DS 2.2 – Main Drain (160mm Ø perforated)
- DS 2.3 – Main Drain (225mm Ø non-perforated)



DS 2.4 – Lateral Drains  
DS 2.5 – Flushing Point  
DS 3.1 – Slit Drains  
DS 3.2 – Gravel Bands  
DS 4.1 – Catchment Drains  
DS 4.2 – Swale Drains  
DS 5.1 – Natural Turf Cricket Block  
DS 5.2 – Concrete Cricket Pitch