South Carolina
Department of Transportation

June 18, 2004

INSTRUCTIONAL BULLETIN NO. 2004-13

SUBJECT: Rolled Erosion Control Production (Revised)
EFFECTIVE DATE: July 1, 2004
SUPERSEDES: Plan Preparation Guide, Chapter 17, Section 6
RE: Instruction Bulletin No. 2004-5
Supplemental Specification "Rolled Erosion Control Products" dated June 1, 2004

Beginning with all projects in the August 2004 Highway Letting, the attached Supplemental Specification referenced above will be in effect. Changes to the pay items are as follows: (Note the changes in units)

Old Pay Item		
8151100	PERMANENT EROSION CONTROL MAT – STANDARD	SY
8151105	PERMANENT EROSION CONTROL MAT - HEAVY DUTY	SY
New Pay Item		
8151101	PERMANENT TURF REINFORCEMENT MATTING (TYPE 1)	MSY
8151102	PERMANENT TURF REINFORCEMENT MATTING (TYPE 2)	MSY
8151103	PERMANENT TURF REINFORCEMENT MATTING (TYPE 3)	MSY
8151104	PERMANENT TURF REINFORCEMENT MATTING (TYPE 4)	MSY

Old Pay Item		
8151110	EROSION CONTROL BLANKET	SY
New Pay Item		
8151111	TEMPORARY EROSION CONTROL BLANKET (CLASS A)	MSY
8151112	TEMPORARY EROSION CONTROL BLANKET (CLASS B)	MSY
8151113	TEMPORARY EROSION CONTROL BLANKET (CLASS C)	MSY

Approved: _____
E. S. Eargle
Road Design Engineer

ESE:afg

Attachment

cc:
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ROLLED EROSION CONTROL PRODUCTS (RECP) SPECIFICATIONS

This supplemental specification replaces sections 815.03 and 815.15 for Permanent Erosion Control Mat, and sections 815.04 and 815.16 for Erosion Control Blanket in the South Carolina Department of Transportation Standard Specifications for Highway Construction Edition of 2000.

DESCRIPTION

All fabrics used for erosion prevention and sediment control on SCDOT construction projects shall be designated as Rolled Erosion Control Products (RECPs). These RECPs shall be classified into two categories:

1. Temporary Erosion Control Blankets, and
2. Turf Reinforcement Matting.

APPROVED: David B. Law
Division Administrator
By: April 26, 2004
FEDERAL HIGHWAY ADMINISTRATION

MATERIALS

TEMPORARY EROSION CONTROL BLANKETS

Temporary erosion control blankets are products composed primarily of biologically, photochemically or otherwise degradable constituents such as wheat straw, coconut fiber, or aged curled excelsior wood product with longevity of approximately 1- to 3-years.

Temporary erosion control blankets shall be separated into three categories.

Class A -(Slope Applications Only) Applicable for slopes **2.0H:1V** or flatter only. Slopes greater than **2.0H:1V** require Turf Reinforcement Matting (TRM).

Class B -(Channel Applications) Applicable for channels and concentrated flow areas with a maximum calculated design shear stress less than **1.75 lb/ft^2**. Channels and concentrated flow areas with design shear stresses greater than **1.75 lb/ft^2** require Turf Reinforcement Matting (TRM).

All Class A and Class B temporary erosion control blankets shall have the following properties:

- Utilize non-organic, photodegradable or biodegradable polypropylene netting.
- Consist of double netted matting. Double netted matting shall be defined as matting with netting on both sides of the blanket. The top netting shall be degradable polypropylene with a maximum mesh opening of 0.75-inches by 0.75-inches. The bottom netting shall be degradable polypropylene with a maximum mesh opening of 0.5-inches by 0.5-inches.
- Be sewn on center a maximum of 2.0-inches.

Class A and Class B temporary erosion control blankets shall have the following Minimum Average Roll Values (MARV) for physical properties, as derived from quality control testing performed by a Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP) accredited laboratory:

- Minimum mass per unit area (ASTM D6475) of 8 oz/yd^2 (271 g/m^2),
- Minimum thickness (ASTM D6525) of 0.25-inches (6 mm),
- Minimum initial grab tensile strength (ASTM D6818) of 75 x 75 lb/ft. (1 x 1 kN/m),
- Minimum roll width of 48-inches (1.22 m), and
- For Class B channel applications a minimum unvegetated shear stress of 1.0 lb/ft^2 (48 N/m^2) based on short-term peak flow duration of 0.5 hour is required.

CLASS C – TEMPORARY BLANKETS FOR ANIONIC POLYACRYLAMIDE SLOPE APPLICATIONS

Temporary blankets for erosion control anionic polyacrylamide slope applications consist of a uniform organic temporary erosion control blankets. Acceptable blanket materials include jute, excelsior, and coconut. Blankets containing straw or straw coconut blends are not allowed under this specification.

Erosion control anionic polyacrylamides shall be applied with the temporary blanket and seeding on areas where the establishment of temporary erosion control is critical and seeding needs additional reinforcement. Temporary blankets for anionic polyacrylamide slope applications shall be used on slopes **2.0H:1V** or flatter.

Temporary blankets for polyacrylamide slope applications shall conform to the following Minimum Average Roll Values (MARV) for physical properties, as derived from quality control testing performed by a Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP) accredited laboratory:

Jute Netting

- Consist of a uniform, open, plain weave, undyed and unbleached jute yarn,
- Loosely twisted construction yarn that does not vary in thickness by more than 0.5 its normal diameter,
- Minimum roll width of 48-inches (1.22 m),
- Minimum thickness (ASTM D1777) 0.35-inches (8.9 mm),
- Yarn Warp Count (ASTM D3775) of 19.5 minimum per 1 foot (0.3048 m) of width,
- Yarn Weft Count (ASTM D3775) of 14.0 minimum per 1 foot (0.3048 m) of width,
- Minimum mass per unit area (ASTM D3776) of 9 oz/yd^2 (305 g/m^2),
- Minimum dry grab tensile strength (ASTM D4632) 300 x 175 lb/ft (4.38 x 2.56 kN/m),
- Minimum wet grab tensile strength (ASTM D4632) 125 x 65 lb/ft (1.83 x 0.95 kN/m),
- Minimum open area of 50%, and
- Minimum openings of approximately 0.5 to 1.0-inches (13 to 255 mm) in width and length.

Excelsior Blankets

- Consist of curled excelsior interlocking fibers with 80% of the fibers a minimum of 6-inches (15.2 cm) long,
- Be a double netted blanket,
- Netting shall be degradable polypropylene with a maximum mesh opening of 1.0-inches by 1.0-inches,
- Minimum roll width of 48-inches (1.22 m),
- Minimum mass per unit area (ASTM D6475) of 10 oz/yd^2 (339 g/m^2),
- Minimum thickness (ASTM D6525) of 0.35-inches (9 mm),
- MD-Tensile strength (ASTM D5035) of 120 lb/ft. (1.76 kN/m),
- TD-Tensile strength (ASTM D5035) of 70 lb/ft. (1.02 kN/m),
- Maximum MD-Elongation (ASTM D5035) of 30%,
- Maximum TD-Elongation (ASTM D5035) of 20%.

Coconut Blankets

- Consist of 100% coconut fiber,
- Be a double netted blanket,
- Netting shall be degradable with a maximum mesh opening of 0.75-inches by 0.75-inches,
- Minimum roll width of 48-inches (1.22 m),
- Minimum mass per unit area (ASTM D6475) of 8 oz/yd^2 (271 g/m^2),
- Minimum thickness (ASTM D177) of 0.25-inches (6 mm),
- MD-Tensile strength (ASTM D4595) of 190 lb/ft. (2.78 kN/m),
- TD-Tensile strength (ASTM D4595) of 190 lb/ft. (2.78 kN/m),
- Maximum MD-Elongation (ASTM D4595) of 20%,
- Maximum TD-Elongation (ASTM D4595) of 20%.

Type 1

Constructed of a web of mechanically or melt bonded polymer netting, monofilaments or fibers that are entangled to form a strong three-dimensional stable net structure. Bonding methods include polymer welding, thermal or polymer fusion or the placement of fibers between two high-strength biaxially oriented nets mechanically bound by parallel stitching with polyolefin thread. A degradable fiber matrix may be included to provide immediate coverage for bare soil. Matting of this type shall be placed on slopes **2.0H:1V** or flatter or in channels where the calculated design shear stress is **4.0 lb/ft^2** or less and a design flow velocity up to **10-ft/sec.**

Type 2

Constructed of a web of mechanically or melt bonded polymer netting, monofilaments or fibers that are entangled to form a strong three-dimensional stable net structure. Bonding methods include polymer welding, thermal or polymer fusion or the placement of fibers between two high-strength biaxially oriented nets mechanically bound by parallel stitching with polyolefin thread. A degradable fiber matrix may be included to provide immediate coverage for bare soil. Matting of this type shall be placed on slopes **1.5H:1V** or flatter or in channels where the calculated design shear stress is **6.0 lb/ft^2** or less and a design flow velocity up to **15-ft/sec.**

Type 3

Constructed of a web of mechanically or melt bonded polymer netting, monofilaments or fibers that are entangled to form a strong three-dimensional stable net structure. Bonding methods include polymer welding, thermal or polymer fusion or the placement of fibers between two high-strength biaxially oriented nets mechanically bound by parallel stitching with polyolefin thread. The matrix shall provide sufficient thickness, strength and void space to capture and retain soil and allow for the development of root growth and vegetation within the matrix. The matrix shall possess strength and elongation properties to limit stretching and be maintained in water-saturated conditions. TRMs manufactured from discontinuous or glued netting shall not be allowed in this category. Matting of this type shall be placed on slopes **1.0H:1V** or flatter or in channels where the calculated design shear stress is **8.0 lb/ft^2** or less and a design flow velocity up to **20-ft/sec.**

Type 4 (High Survivability)

Geosynthetics specially designed for erosion control applications on steepened slopes and vegetated waterways. The matrix is composed of monofilament yarns woven into a resilient uniform configuration. The matrix shall exhibit very high interlock and reinforcement capacities with both soil and root systems and demonstrate a high tensile modulus. TRM's manufactured from discontinuous or loosely held together by stitched or glued, netting, or composites are not allowed in this category. All components of Type 4 TRMs shall be 100% synthetic and resistant to biological, chemical and ultraviolet degradation. Matting of this type shall be placed on slopes **1H:1V** or greater or in channels where the calculated design shear stress is up to **12 lb/ft^2** and design flow velocity up to **25-ft/sec.** This category is used when field conditions exist with high loading and/or high survivability requirements. These requirements consist of maintenance, structural backfills protecting critical structures, utility cuts, potential traffic areas, abrasion, higher factors of safety and/or general durability concerns.

All primary TRM matrix materials shall be defined as long-term non-degradable materials designed to reduce soil erosion and assist in the growth, establishment and protection of vegetation for a period of time exceeding 5 years. The major structural components of Type 1 and Type 2 TRMs shall be 100% synthetic and resistant to biological, chemical, ultraviolet degradation and a degradable fiber matrix may be included to provide immediate coverage for bare soil. All components of Type 3 and Type 4 TRMs shall be 100% synthetic and resistant to biological, chemical and ultraviolet degradation. The TRM materials shall conform to the Minimum Average Roll Values (MARV) for physical properties, as derived from quality control testing performed by a Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP) accredited laboratory shown in the following table:

Notes:

	Property	Test Method	Type 1[1]	Type 2[1]	Type 3[1]	Type 4[1,6]
General	Mass per Unit Area	ASTM D6475	8 oz/yd^2 (271 g/m^2)	10 oz/yd^2 (340 g/m^2)	14 oz/yd^2 (475 g/m^2)	14 oz/yd^2 (475 g/m^2)
	Thickness	ASTM D6525	0.35 in (8.9 mm)	0.50 in (12.7 mm)	0.50 in (12.7 mm)	0.50 in (12.7 mm)
Index	Grab Tensile Strength[2]	ASTM D6818	145 x 110 lb/ft (2.1 x 1.6 kN/m)	170 x 130 lb/ft (2.4 x 1.8 kN/m)	400 x 300 lb/ft (5.7 x 4.3 kN/m)	3,100 x 1,500 lb/ft (45.2 x 22.0kN/m)
	Tensile Elongation[2]	ASTM D6818	50% (max)	50% (max)	50% (max)	55% (max)
	UV Resistance[3]	ASTM D4355	80 % @ 1000 hrs	80 % @ 1000 hrs	80% @1000 hrs	90 % @ 1000 hrs
	Ground Cover Factor[4]	Light Projection Analysis	60%	70%	70%	75%
Performance	Slopes	--	2.0H:1V or Flatter	1.5H:1V or Flatter	1.0H:1V or Flatter	1.0H:1V or Greater
	Short-term Vegetated Velocity[5]	--	< 10-ft/sec (3.1 m/sec)	10- to 15-ft/sec (3.1- 4.6 m/sec)	15- to 20-ft/sec (4.6 - 6.1 m/sec)	20- to 25-ft/sec (6.1-7.6 m/sec)
	Shear Stress[5]	--	0-4 lb/ft^2 (192 N/m^2)	4-6 lb/ft^2 (192-289 N/m^2)	6-8 lb/ft^2 (289-383 N/m^2)	8-12 lb/ft^2 (383-576 N/m^2)

1 All physical property values shall be derived from quality control testing performed by a GAI-LAP accredited lab.
2 Values of both machine and cross machine directions, respectively, under dry or saturated conditions.
3 Tensile strength retained of structural components after exposure.
4 Ground Cover Factor represents "% shade" from Lumite Light Projection Test.
5 Maximum permissible design values based on short-term (0.5-hr), vegetated data obtained at SCDOT-approved independent hydraulics testing facility on an erodible soil bed and/or by Colorado State University Hydraulics Laboratory or the Texas DOT's Texas Transportation Institute (TTI) Hydraulics and Erosion Control Laboratory for "Flexible Channel Liner Applications."
6 Higher factor of safety required, high survivability.

QUALITY ASSURANCE SAMPLING, TESTING, AND ACCEPTANCE

(1) RECPs shall be subject to sampling and testing to verify conformance with this specification. Sampling for testing shall be in accordance with ASTM D-4354.

(2) Acceptance shall be in accordance with ASTM D-4759 based on testing performed by a Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP) accredited laboratory of either conformance samples obtained using Procedure A of ASTM D-4354, or based on Manufacturer's certification and testing of quality control samples obtained using Procedure B of ASTM D-4354.

(3) Quality Assurance Sampling and Testing will be waived for products manufactured at an ISO 9002 Certified Manufacturing Facility. Documentation of ISO 9002 Certification shall be provided upon request.

(4) RECPs shall be listed on the SCDOT Approved Products List (APL) in the appropriate category prior to being accepted for use. Prior to inclusion on the APL, the RECP must meet the physical and performance criteria as outlined in this specification.

MANUFACTURING QUALITY CONTROL

(1) For TRM Types 1, 2, 3 and 4 the Manufacturing Quality Control (MQC) testing shall be performed at a laboratory accredited by GAI-LAP for tests required for the turf reinforcement mat, at a frequency exceeding ASTM D-4354, with the following minimum acceptable testing frequency:

Property	Test Method	Test Frequency Tests/m^2 (yd^2) of production
Mass Per Unit Area	ASTM D-6475	1/20,000 (1/24,000)
Tensile Strength	ASTM D-6818	1/20,000 (1/24,000)
Tensile Elongation	ASTM D-6818	1/20,000 (1/24,000)
Ground Cover Factor	Light Projection Analysis	1/20,000 (1/24,000)

(2) Letters of certification signed by a responsible representative of the Manufacturer shall be sent within 24 hour of each truckload shipment of material to the construction site.

CONSTRUCTION REQUIREMENTS

SITE PREPARATION

(1) Grade areas to be treated with RECPs and compact as indicated or as directed by the Engineer or Manufacturer's Representative.

(2) Remove large rocks, soil clods, vegetation, and other sharp objects that could keep the RECP from intimate contact with subgrade.

(3) Prepare seedbed by loosening the top 2 to 3 inches (50 to 75 mm) of soil above final grade.

(4) Select and apply soil amendments, lime, fertilizer and seed as required by the seeding plan or by the Engineer or Manufacturer's Representative to a scarified soil surface prior to the installation of the RECP.

GENERAL INSTALLATION

Always follow the specific Manufacturer's installation procedures that are included with each RECP. When requested by the Resident Construction Engineer, a Manufacturer's Representative shall be required to be on-site to oversee and approve the initial installation of the RECP. When requested by the Resident Construction Engineer, a letter from the Manufacturer approving the contractor installation shall be required. The following procedures represent minimum installation techniques.

(1) Install the RECP at the elevation and the alignment as indicated on the plans.

(2) Stakes, Pins or Staples Used for Securing RECPs:

(a) Stakes, pins, or staples used for securing Temporary Erosion Control Blankets shall be a minimum of 6-inches (150 mm) in length. 12-inch (300 mm) anchors are required for specific Erosion Control Blankets in sandy, loose, or wet soils or as directed by the Engineer or Manufacturer's Representative.

(b) Stakes, pins, or staples used for securing Permanent Turf Reinforcement Matting (TRMs) shall be a minimum of 12-inches (300 mm) in length. Longer anchors shall be necessary for specific Permanent Turf Reinforcement Matting in sandy, loose, or wet soils or as directed by the Engineer or Manufacturer's Representative.

(3) General Slope Applications: (These are the minimum requirements but always follow the Manufacturer's recommendations).

(a) At the top of the slope construct a 6-inch x 12-inch (150 mm x 300 mm) anchor trench to inhibit undermining from stray surface water. Extend the upslope terminal end of the RECP 30-inch (760 mm) past the anchor trench.

(b) Using stakes or staples, fasten the RECP material into the upslope anchor trench on 12-inch (300 mm) centers. Backfill the trench with soil and compact. Apply seed to the backfilled soil surface and cover this area with the remaining 12-inches (300 mm) of the RECP terminal end. Stake or staple the terminal end down slope of the anchor trench on 12-inch (300 mm) centers.

(c) Securely fasten all RECP materials to the soil by installing stakes or staples at a minimum rate of 1.5 stakes per square yard. Anchors shall be selected so that they have sufficient ground penetration to resist pullout. Increased anchoring frequency shall be required if site conditions (loose or wet soils) are such that the Engineer or Manufacturer's Representative determines it necessary.

(d) For slope applications, unroll the RECP parallel to the primary direction of water flow and place in direct contact with the soil surface. Do not stretch or allow the material to bridge over surface inconsistencies. Overlap the edges of adjacent (vertically down the slope) RECPs a minimum of 3-inches (75 mm) with the upslope roll overlapping on top of the down slope roll in shingle style.

(e) The edges of parallel (horizontal across the slope) blankets shall be overlapped 3- to 6-inches depending on the type of RECP used.

(4) General Channel Applications: (These are the minimum requirements but always follow the Manufacturer's recommendations).

(a) For channel installations, construct excavated anchor trenches, and or staple check slots perpendicular to the flow direction across the entire width of the channel at 25-foot (8 meter) intervals and at the terminal end of the channel reach.

(b) Construct a 6-inch x 12-inch (150 mm x 300 mm) beginning anchor trench. Extend the downstream end of the RECP 30-inches (760 mm) past the anchor trench and use the slack RECP material to cover the backfilled soil. Fasten the RECP material into the anchor trench on 12-inch (300 mm) centers.

(c) Excavate 6-inch x 6-inch (150 mm x 150 mm) check slots every 25 feet (7.6 meters) along the length of the channel.

(d) At the Engineer's discretion, excavated check slots shall be replaced by a double row of staples or stakes. For staple or stake check slots, place the two rows of stakes or staples 4-inches (100 mm) apart and install each row of staple or stakes on 12-inch (300 mm) centers. Drive all stakes and staples flush with the soil surface.

(e) Beginning at the downstream end in the center of the channel, place the initial end of the first RECP in the anchor trench and secure it with ground anchor devices at 12-inch (300 mm) intervals.

(f) Position adjacent rolls in the anchor trench in the same manner, overlapping the proceeding roll a minimum of 3-inches (75 mm). Secure the RECP at 12-inch (300 mm) intervals along the anchor trench, backfill and compact with specified soil or as directed by the Engineer or Manufacturer's Representative.

(g) Unroll center strip of RECP upstream over compacted trench. Stop at next check slot or terminal anchor trench. Unroll adjacent rolls of RECPs upstream in similar fashion, maintaining a 3-inch (75 mm) overlap.

(h) Fold and secure the RECP snugly into transverse check slots. Lay material in bottom of the slot, then fold the material back against itself as indicated. Anchor through both layers of RECP at 12-inch (300 mm) intervals. Backfill with soil and compact. Continue unrolling the RECP widths upstream over compacted slot to next check slot or terminal anchor trench.

(i) Secure RECP to channel bottom with ground anchoring devices at a frequency of 2-½ anchors per square yard (3 anchors per square meter). Anchors shall be selected so that they have sufficient ground penetration to resist pullout. Increased anchoring frequency shall be required if site conditions (loose or wet soils) are such that the Engineer or Manufacturer's Representative determines it necessary.

Slope Grade	Anchoring Frequency
Up to 3H:1V	1 anchor/square yard
3H:1V to 2H:1V	1.5 anchors/square yard
2H:1V to 1H:1V	2 anchors/square yard
Steeper than 1H:1V and Channel Bottoms	2.5 anchors/square yard

(j) Cut longitudinal anchor slots 4-inch x 4-inch (100 mm x 100 mm) at the top of each slope. Fasten the RECP material into the longitudinal anchor slots on 12-inch (300 mm) centers.

(5) The Engineer and Manufacturer's Representative must approve all alternate installation methods prior to execution.

(6) Repair all damaged areas immediately by restoring the soil to its finished grade, re-apply fertilizer and seed, and replacing the RECP material as needed.

DELIVERY, STORAGE, AND HANDLING

RECP labeling, shipment and storage shall follow ASTM D-4873. Product labels shall clearly show the Manufacturer or supplier name, style name, and roll number.

Each shipping document shall include a notation certifying that the material is in accordance with the Manufacturer's certificate.

Each RECP roll shall be wrapped with a material that will protect the geotextile from damage due to shipment, water, sunlight, and contaminants. The protective wrapping shall be maintained during periods of shipment and storage. During storage, RECP rolls shall be elevated off the ground and adequately covered to protect them from the following:

- Site construction damage,
- Extended exposure to ultraviolet (UV) radiation,
- Precipitation,
- Chemicals that are strong acids or strong bases,
- Flames,
- Sparks,
- Temperatures in excess of 160°F , and
- Other environmental conditions that can damage the physical properties RECPs.

INSPECTION AND MAINTENANCE

Areas protected by RECPs shall be checked for dislocation or failure every seven (7) calendar days and within 24-hours after each rainfall event that produces ½-inch or more of precipitation.

The pinning or stapling pattern shall be consistent with that shown on the Manufacturer's installation sheet. If there is evidence that the RECP is not securely fastened to the soil, extra pins or staples shall be required to inhibit the RECP from becoming dislodged.

Regular inspections shall take place until grass or vegetation is firmly established.

Repair all damaged areas immediately by restoring the soil on slopes or channels to its finished grade, re-apply fertilizer and seed, and replacing the appropriate RECP material as needed.

ACCEPTANCE CRITERIA

The Resident Construction Engineer shall approve all RECP installations. When requested by the Resident Construction Engineer, a Manufacturer's Representative shall be required to be on-site to oversee and approve the initial installation of the RECP. When requested by the Resident Construction Engineer, a letter from the Manufacturer approving the contractor installation shall be required.

METHOD OF MEASUREMENT:

The application of Rolled Erosion Control Products (RECPs) shall be measured by the surface area covered. Quantities are to be computed to the nearest MSY (Thousand Square Yards) including seams, overlaps, anchor trenches, and wastage.

BASIS OF PAYMENT:

The Engineer will pay for RECPs to the nearest MSY (Thousand Square Yards) accepted. The Engineer will not pay for damaged RECPs. The installation must be accepted and certified by the Manufacturer's Representative, or Engineer prior to payment. The Engineer will pay for RECPs at the contract unit price. Payment is full compensation for all materials, labor, tools equipment, and incidentals necessary to complete the work herein described in a workmanlike and acceptable manner. Bid Item Numbers and Descriptions are as follows:

Bid Item Number	Description	Units
8151111	Temporary Erosion Control Blanket (ECB) Class A	MSY
8151112	Temporary Erosion Control Blanket (ECB) Class B	MSY
8151113	Temporary Erosion Control Blanket (ECB) Class C	MSY
8151101	Turf Reinforcement Matting (TRM) Type 1	MSY
8151102	Turf Reinforcement Matting (TRM) Type 2	MSY
8151103	Turf Reinforcement Matting (TRM) Type 3	MSY
8151104	Turf Reinforcement Matting (TRM) Type 4	MSY