

TRANSPORT FOR NSW (TfNSW)

SPECIFICATION D&C 3071

SELECTED MATERIAL FOR FORMATION LAYERS

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Transport
for NSW

SPECIFICATION D&C 3071

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FOREWORD

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BASE SPECIFICATION

This document is based on Specification TfNSW 3071 Edition 2 Revision 2.

TfNSW SPECIFICATION D&C 3071

SELECTED MATERIAL FOR FORMATION LAYERS

1 SCOPE

This Specification sets out the requirements for the supply of Selected Material for formation layers from sources outside the Construction Site.

The Selected Material can be naturally occurring, recycled or manufactured.

2 STRUCTURE OF THE SPECIFICATION

This Specification includes a series of annexures that detail additional requirements.

2.1 PROJECT SPECIFIC REQUIREMENTS

Project specific details of work are shown in Annexure 3071/A.

2.2 SCHEDULES OF HOLD POINTS AND IDENTIFIED RECORDS

The schedules in Annexure 3071/C list the **HOLD POINTS** that must be observed. Refer to Specification TfNSW D&C Q6 for the definition of **HOLD POINTS**.

The records listed in Annexure 3071/C are **Identified Records** for the purposes of TfNSW D&C Q6 Annexure Q/E.

2.3 FREQUENCY OF TESTING

The minimum frequency of testing is shown in Annexure 3071/L.

2.4 REFERENCED DOCUMENTS

Standards, specifications and test methods are referred to in abbreviated form (e.g. AS 2350). For convenience, the full titles are given in Annexure 3071/M.

3 DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

The terms “you” and “your” mean respectively “the Contractor” and “the Contractor’s”, or “the Supplier” and “the Supplier’s”, as appropriate.

The term “the Supplier” means the supplier of the material covered by the scope of this Specification.

The following definitions apply to this Specification:

- Modified material:** Unbound material which have been mixed with a small proportion of binder.
- Selected Material Zone:** The top part of the Upper Zone of Formation (usually 300 mm thick) in which material of a specified higher quality is required.
- Selected Material:** Material of a specified quality used in the Selected Material Zone.
- Steel furnace slag** A waste by-product in the production of steel using the Basic Oxygen Steel (BOS) or Electric Arc Furnace (EAF) processes. Steel furnace slag does not include any bag house dust or air pollution control residues.

3.2 ACRONYMS

- MDCS** Maximum Dry Compressive Strength
- SMZ** Selected Material Zone
- UCS** Unconfined compressive strength

4 SUPPLIER'S QUALITY MANAGEMENT SYSTEM

The Supplier must establish and maintain a Quality Management System complying with AS/NZS ISO 9001 as a means of ensuring that the material conforms to this Specification.

Provide evidence verifying compliance with this Clause.

5 MATERIAL REQUIREMENTS

5.1 PARTICLE SIZE DISTRIBUTION AND OTHER PROPERTIES

Selected Material must comply with the requirements of Tables 3071.1 and 3071.2. The Supplier may propose alternative materials, including those with a different particle size distribution or CBR, for acceptance by the Principal.

Pretreatment of the test samples must be carried out where specified in Annexure 3071/A2.

Table 3071.1 - Particle Size Distribution

AS Sieve	% Passing (by mass) ⁽¹⁾
53 mm	100
37.5 mm	95 – 100
19.0 mm	50 – 85
6.7 mm	40 – 80
2.36 mm	35 – 70

Note:

⁽¹⁾ Determined using Test Method TfNSW T106, after pretreatment specified in Annexure 3071/A2.

Table 3071.2 – Other Properties

Property	Test Method	Requirement ⁽¹⁾
CBR _{4 day} ⁽²⁾ , characteristic value (%)	TfNSW T117	
SMZ, upper 150 mm thick layer		33 ^(3,4) min
SMZ, lower layer		19 min
Plasticity Index (PI)	TfNSW T108 and T109	15 max
MDCS (MPa)	TfNSW T114	2 min (if PI < 3)
UCS ⁽⁵⁾ (MPa)	TfNSW T131 ⁽⁶⁾	1.5 max

Legend:

SMZ: Selected Material Zone min: minimum max: maximum

MDCS: Maximum Dry Compressive Strength UCS: Unconfined compressive strength

Notes:

- ⁽¹⁾ After any pretreatment specified in Annexure 3071/A2.
- ⁽²⁾ For the fraction passing 19.0 mm AS sieve. Compact test samples to 100% of maximum dry density and soak for 4 days.
- ⁽³⁾ See Clause 5.2.
- ⁽⁴⁾ Where the material is modified by use of binder, the UCS requirement must also be met.
- ⁽⁵⁾ Applicable only to modified Selected Material.
- ⁽⁶⁾ Accelerated curing of samples to Test Method TfNSW T131 must not be used when determining the mix design binder content to meet the required UCS criteria but may be used for Lot conformity assessment.

5.2 MODIFIED SELECTED MATERIAL

5.2.1 General

Where the characteristic value of CBR for the material is greater than 19% but less than 33%, the material may be modified by use of binder to meet the CBR requirements for the top 150 mm layer of the Selected Material Zone, using a stationary mixing plant with moisture control.

The binder used must comply with the requirements of Specification TfNSW D&C 3211.

5.2.2 Allowable Time

The maximum allowable time between the incorporation of binder and completion of placing and compaction of the modified Selected Material is specified in Annexure 3071/A3.

You may propose for the Principal's acceptance the use of a different binder with a different allowable working time, which has been determined in accordance with Test Method TfNSW T147 for maximum dry density.

5.3 SLAG AND RECYCLED MATERIALS

5.3.1 Recycled Materials

Where recycled materials are proposed for use as Selected Material, the amount of foreign material must not exceed the limit specified in Table 3071.3.

Table 3071.3 – Allowable Limits of Foreign Material in Recycled Material Proposed for Use as Selected Material

Type	Description	Allowable Limit ⁽¹⁾ (% by mass)
1	Metal, glass ⁽²⁾ and ceramics	5 max
2	Plaster, clay lumps and other friable material	1 max
3	Rubber, plastic, paper, cloth paint, wood and other vegetable matter	0.2 max

Notes:

⁽¹⁾ Determined using Test Method TfNSW T276.

⁽²⁾ Glass must comply with Specification TfNSW D&C 3154.

Do not use recycled material containing coal tar.

5.3.2 Reclaimed Asphalt Pavement Material

Reclaimed asphalt pavement material complying with Specification TfNSW D&C 3153 may be used when mixed with Selected Material, up to a maximum limit of 25% by mass.

5.3.3 Steel Furnace Slag

Do not use steel furnace slag aggregates.

5.4 WATER

Water used in the Selected Material must be free from deleterious amounts of materials such as oils, acids, alkalis, organic matter and any other matter which could affect the chemical reaction.

Water that is not taken from a town water supply system must comply with the requirements in Table 3071.4.

Table 3071.4 – Properties of Non-Town Water

Property	Test Method	Upper Limit
Chloride ion (mg/L)	T1004	600
Sulfate ion (mg/L)	T1014	400
Undissolved solids (% by mass)	AS 3550.4	1

Where recycled water is proposed for use, the water must meet the above requirements and those in Specification TfNSW D&C G36 with the maximum concentration of 1,000 thermo-tolerant coliforms per 100 ml when tested in accordance with Test Method TfNSW T1015.

5.5 NOMINATED SELECTED MATERIAL

5.5.1 Submission of Nominated Selected Material Details

Prior to commencement of supply, submit to the Principal the following details of the nominated Selected Material:

- (a) For **each nominated material**:
 - (i) Description (material type).
 - (ii) Average particle size distribution of the material, known as the “nominated particle size distribution”.
 - (iii) Maximum Dry Density (t/m^3), determined in accordance with Test Method TfNSW T111.
 - (iv) Source(s) of constituent materials.
 - (v) Blend proportions for blended materials.
 - (vi) Method of producing the nominated material.
- (b) For **modified Selected Material**, details of the type and percentage of binder(s), and the process to ensure that, during production, the binder(s) is mixed uniformly and to the proportion specified.
- (c) For **recycled material**, test results for a sample of the nominated recycled material to verify that the foreign material content are within the limits stated in Table 3071.3.

Include a signed certification stating that the nominated Selected Material meets the requirements of this Specification, together with a copy of the supplier’s checklist verifying conformity of each of the relevant properties specified in Clause 5.1, and associated NATA endorsed test results which are no older than 3 months old.

5.5.2 Variation to Nominated Selected Material

If a change to the source of supply, blend proportions, method of production or the proportion or type of binder is proposed, submit details of the new nominated Selected Material in accordance with Clause 5.5.1.

6 CERTIFIED STOCKPILES AT SOURCE

6.1 SUPPLY FROM CERTIFIED STOCKPILES

The Supplier may supply the Selected Material from certified stockpiles which have been previously tested and shown to conform to the requirements of this Specification.

Stockpiling methods, identification and sampling must be in accordance with Clauses 7.2.2, 7.2.4 and 8.1.2 respectively.

Once a particular stockpile has been certified as conforming to the requirements of this Specification, do not add further material to that stockpile unless the additional material has been tested and verified as conforming to this Specification. Provide the test certificates verifying the conformity of all such additional material.

6.2 RELEASE FROM CERTIFIED STOCKPILES

Prior to the release of material from a certified stockpile, provide a signed statement certifying that the material from the identified stockpile conforms to the requirements of this Specification, including NATA endorsed test results and clearly indicating the quantity of material represented by the results.

Each delivery docket must identify the certified stockpile from which the material is being supplied.

Material supplied from certified stockpiles will generally require no further testing unless it is to be modified.

6.3 CHANGED PROPERTIES

However, if subsequent inspection and/or testing of the material at the stockpile or at the point of delivery indicates that the properties of the material have changed since certification, for example, by segregation, contamination or weathering, the Principal may stop further deliveries, and require further sampling and testing of the stockpile.

The conformity or otherwise of the material will then be assessed on the basis of these results.

7 DELIVERY OF MATERIAL

HOLD POINT

Process Held:	Delivery of Selected Material to the Site from a certified stockpile.
Submission Details:	At least five working days prior delivery of material from a new certified stockpile, provide notification of intended delivery and submit the details specified in Clause 6.2.
Release of Hold Point:	The Nominated Authority will consider the submitted details and may request further information, prior to authorising the release of the Hold Point.

7.1 TRANSPORT

7.1.1 Transport Vehicles

Transport the Selected Material in vehicles which are so constructed that loss of material does not occur. The delivery vehicles used must be suitable for the ground conditions at the Construction Site.

7.1.2 Moisture Content

Keep the material suitably moist to prevent segregation or loss of fines during transit. At the time of delivery, the material must have a moisture content (uniformly distributed) of within 60% to 90% of the optimum moisture content, as determined by Test Method TfNSW T111.

7.1.3 Segregated or Contaminated Material

Material delivered to the Construction Site which is segregated or contaminated (except for foreign materials in recycled materials within the limits stated in Clause 5.3.1) is considered to be nonconforming, and must be dealt with in accordance with Clause 9.3.

7.2 SITE STOCKPILES

7.2.1 (Not Used)

7.2.2 Placing Material in Stockpiles

Place stockpiles on clear, even, well-drained, firm ground or over a constructed floor.

Keep each stockpile well separated from the others to prevent cross-contamination and segregation, and maintain the moisture content of the material in the stockpile within the limits stated in Clause 7.1.2.

Place the material in the stockpiles in horizontal layers, with each new layer fully within the perimeter of the underlying layer. Do not push the stockpile into a cone shape.

Each stockpile must not exceed 4 m in height.

7.2.3 Lots

For the purpose of delineating Lots, place the material in each stockpile in such manner that either:

- (a) each stockpile represents only one Lot or,
- (b) the stockpile of the one material type is built up incrementally in such a way that each new Lot of material added is tested and found to be conforming before any further new Lots of material is added.

Each Lot is limited to a maximum size of 4000 tonnes.

7.2.4 Stockpile Identification

Clearly and uniquely identify stockpiles by signposting. Indicate the amount and type of material on the signposting.

8 SAMPLING AND TESTING

8.1 GENERAL

8.1.1 Times of Sampling

Where the material is not supplied from a certified stockpile, sample the delivered material from site stockpiles within three days of completing the stockpile.

For modified material, sample within the allowable time stated in Annexure 3071/A3 to verify conformity with Table 3071.2 for MDCS and UCS.

8.1.2 Sampling Method

Carry out sampling in accordance with AS 1141.3, and state the sampling method used on the relevant NATA endorsed test certificate.

Provide a statement accompanying any test certificate that the samples tested are representative of the material to be supplied under the deed.

8.2 FREQUENCY OF SAMPLING AND TESTING

8.2.1 General

The requirements of this clause will apply regardless of whether sampling is carried out at the source or at the point of delivery.

The frequency of sampling and testing for a Lot must not be less than the frequency specified in Annexure 3071/L.

8.2.2 Production Process Under Control

You may adopt the reduced frequency of testing specified in Annexure 3071/L provided that you can demonstrate that the production process is under control.

The production process is considered to be under control when the requirements shown in Table 3071.5 are achieved.

Table 3071.5 – Production Process Under Control

Characteristic	Test Method	Requirements
CBR	TfNSW T117	Conforming test results from 6 consecutive Lots
Plasticity Index	TfNSW T108 and T109	
MDCS	TfNSW T114	
Foreign material content	TfNSW T276	

Provide the relevant test results, and an estimation of the quantity of material produced over the duration of the tests.

8.2.3 Sampling and Testing After Reduction in Frequency

When a reduced frequency of sampling and testing has been adopted, the samples to be tested must be from the Lot using representative portions of the sub-Lot samples taken, and the results must be representative of the whole Lot. The test certificate must indicate which samples were combined to form the test sample.

Provided that the Lots tested are consecutive and of the same type, the Lots sampled need not form part of the supply under the deed, for the reduced frequency of sampling and testing to be adopted.

8.2.4 Nonconformity After Reduction in Frequency

When a reduced frequency of sampling and testing has been adopted and a sample fails a specified test requirement, reinstate the full minimum frequency specified in Annexure 3071/L for that test until it can be re-established that the process is once again under control.

The production process will be considered to be once again under control when the test results for 3 consecutive Lots are conforming.

9 CONFORMITY

9.1 GENERAL

Where the material is not supplied from certified stockpiles, provide a summary of conformity results for each Lot within 48 hours of completion of testing of samples taken from site stockpiles. Include work sheets where requested by the Nominated Authority.

Document all tests carried out, including any tests whose results were not used for any reason, and provide copies of the reports to the Nominated Authority. Obtain the concurrence of the Nominated Authority for omission of any test data.

9.2 TESTING CRITERIA

Test the material in accordance with the requirements of this Specification and calculate the characteristic value in accordance with TfNSW D&C Q6 Annexure Q/L3.2.

9.3 NONCONFORMITY

Notify the Principal of any cases of nonconforming material and of the action taken to deal with the nonconformity. Do not incorporate nonconforming material in the Works.

ANNEXURE 3071/A – PROJECT SPECIFIC REQUIREMENTS

Refer to Clause 2.1.

A1 (NOT USED)**A2 PRETREATMENT**

NOTES TO TENDER DOCUMENTER: (Delete this boxed text after customising Annexure 3071/A)

Complete Table 3071/A1.2 below by deleting whichever option is not applicable.

Table 3071/A1.2

Item	TfNSW Test Method	Pretreatment Required	
		to T102	to T103
A2.1	T106, T108, T109, T114, T117, T131	Yes ⁽¹⁾	Yes / No

Note:⁽¹⁾ Pretreatment to T102 is always required.**A3 MAXIMUM ALLOWABLE TIME FOR MODIFIED MATERIAL**

NOTES TO TENDER DOCUMENTER: (Delete this boxed text after customising Annexure 3071/A)

Complete Table 3071/A1.3 below by filling in the required details.

Table 3071/A1.3

Item	Description	Requirement
A3.1	Binder type
A3.2	Maximum allowable time between incorporation of binder and completion of placing and compaction hours

ANNEXURE 3071/B – (NOT USED)

ANNEXURE 3071/C – SCHEDULES OF HOLD POINTS AND IDENTIFIED RECORDS

Refer to Clause 2.2.

C1 SCHEDULE OF HOLD POINTS

Clause	Description
7	Delivery of Selected Material to the Construction Site

C2 SCHEDULE OF IDENTIFIED RECORDS

The records listed below are Identified Records for the purposes of TfNSW Q Annexure Q/E.

Clause	Description of Identified Record
5.5.1	Nominated Selected Material details
6.2	Certification, including test results, of conformity of material released from certified stockpiles
8.2.2	Conforming test results from 6 consecutive Lots for adoption of a reduced frequency of testing
9.1	Conformity results for material not supplied from certified stockpiles

ANNEXURES 3071/D TO 3071/K – (NOT USED)

ANNEXURE 3071/L – TESTING REQUIREMENTS**Table 3071/L.1 - Minimum Frequency of Testing**

Total Mass of Lot Represented (tonnes)		1 – 500	501 – 1000	1001 – 2000	2001 – 4000
Number of sub-Lot Samples per Lot		2	3	4	5
Characteristic Tested	Test Method	Minimum Number of Samples to be Tested			
Coarse Particle Distribution	TfNSW T106	2	3	4	5
CBR	TfNSW T117	2 (1)	3 (2)	4 (2)	5 (2)
Liquid Limit (LL)	TfNSW T108	2 (1)	3 (2)	4 (2)	5 (2)
Plastic Limit (PL)	TfNSW T109	2 (1)	3 (2)	4 (2)	5 (2)
MDCS (if PI < 3)	TfNSW T114	1 (0) ⁽ⁱ⁾	1 (0) ⁽ⁱ⁾	2 (0) ⁽ⁱ⁾	3 (0) ⁽ⁱ⁾
UCS ⁽ⁱⁱ⁾ (modified Selected Material only)	TfNSW T131	2	3	4	5
Foreign material content ⁽ⁱⁱⁱ⁾	TfNSW T276	1 (0)	1 (0)	2 (1)	3 (1)

Notes:

The numbers shown within brackets represents the reduced rates of testing allowable under Clause 8.2.2.

⁽ⁱ⁾ Where the reduced rate of sampling is shown as (0), then regardless of Lot size, the minimum frequency of testing will be one per 4,000 tonnes.

⁽ⁱⁱ⁾ Required only for modified Selected Material.

⁽ⁱⁱⁱ⁾ Applicable only to Selected Material manufactured from recycled material.

ANNEXURE 3071/M – REFERENCED DOCUMENTS

Refer to Clause 2.4.

TfNSW Specification

TfNSW D&C Q6	Quality Management System (Type 6)
TfNSW D&C G36	Environmental Protection
TfNSW D&C 3153	Reclaimed Asphalt Pavement Material
TfNSW D&C 3154	Granulated Glass Aggregate
TfNSW D&C 3211	Cements, Binders and Fillers

TfNSW Test Methods

TfNSW T102	Pretreatment of Road Construction Materials by Compaction
TfNSW T103	Pretreatment of Road Construction Materials by Artificial Weathering
TfNSW T106	Coarse Particle Size Distribution of Road Construction Materials (by Dry Sieving)
TfNSW T108	Liquid Limit of Road Materials
TfNSW T109	Plastic Limit and Plasticity Index of Road Construction Materials
TfNSW T111	Dry Density/Moisture Relationship of Road Construction Materials
TfNSW T114	Maximum Dry Compressive Strength of Road Construction Materials
TfNSW T117	California Bearing Ratio of Remoulded Specimens of Road Construction Materials
TfNSW T131	Unconfined Compressive Strength of Road Construction Materials (blended in the Laboratory with Cementitious Binders)
TfNSW T147	Working Time for Road Construction Materials (blended in the Laboratory with Slow Setting Binders)
TfNSW T276	Foreign Materials Content of Recycled Crushed Concrete
TfNSW T1004	Quantitative Determination of Chloride Ion in Water
TfNSW T1014	Quantitative Determination of Sulfate Ion in Water
TfNSW T1015	Microbiology of Water used in Roadworks (Thermotolerant Coliforms)

Australian Standards

AS 1141.3	Methods for sampling and testing aggregates – Sampling of aggregates and rock
AS/NZS ISO 9001	Quality management systems - Requirements