

SOIL MANAGEMENT		STANDARD DRAWING REFERENCE
5.1.1	ENSURE EARTHWORKS AND GRADING ACTIVITIES ARE AVOIDED DURING THOSE PERIODS WHEN RAINFALL IS EITHER OCCURRING OR THE SOIL IS SATURATED.	
5.1.2	WORKING THE SOIL WHEN IT IS TOO WET CAN: - DAMAGE THE SOIL STRUCTURE; - REDUCE THE SOIL'S DRAINAGE PROPERTIES; - INCREASE EROSION AND SEDIMENT RUNOFF.	
INAPPROPRIATE EARTHWORKS PRACTICE		
5.2.1	ENSURE THAT EXCAVATED MATERIAL IS NOT STOCKPILED IN LOCATIONS WHERE IT COULD CAUSE HARM, OR BE WASHED INTO A GUTTER, DRAIN OR WATER BODY, SUCH AS: - WITHIN AN OVERLAND FLOW PATH; - ADJACENT TO STREAM BANKS; - WITHIN THE CANOPY DRIP ZONE OF PROTECTED TREES.	
REPLACEMENT OF TOPSOIL		
5.3.1	ENSURE EXPOSED SUBSOILS ARE SUITABLY COVERED AS SOON AS PRACTICAL, ESPECIALLY IF THE SOILS ARE DISPERSIVE.	
5.3.2	EXPOSED, NON-DISPERSIVE SUBSOILS SHOULD BE COVERED WITH: - A SUITABLE LAYER OF TOPSOIL IF THE AREA IS TO BE REVEGETATED; OR - MULCH OR A SUITABLE CHEMICAL SOIL BINDER IF FINAL EARTHWORKS AND/OR CONSTRUCTION IS DELAYED FOR AN EXTENDED PERIOD.	
5.3.3	EXPOSED, DISPERSIVE SUBSOILS SHOULD BE COVERED WITH A NON-DISPERSIVE SOIL BEFORE ANY FINAL TREATMENT.	
SCARIFYING THE SOIL SURFACE		
5.4.1	ENSURE THE SOIL SURFACE IS SCARIFIED BEFORE REPLACEMENT OF THE TOPSOIL TO BREAK UP ANY EXCESSIVE SOIL COMPACTION, AND ENABLE THE APPROPRIATE KEYING OF THE SOIL LAYERS.	
5.4.2	ON SLOPES LESS THAN 3:1 (H:V), SCARIFY LIGHTLY COMPACTED SUBSOILS TO A DEPTH OF 50-100mm, AND HEAVILY COMPACTED SUBSOILS TO A MINIMUM DEPTH OF 300mm.	
5.4.3	ON SLOPES STEEPER THAN 3:1 (H:V), CHAIN OR HARROW TO BREAK ANY SURFACE-SEALED OR CRUSTY SOIL SURFACES.	

TOPSOIL MANAGEMENT		STANDARD DRAWING REFERENCE
6.1.1	ENSURE TOPSOIL IS PRESERVED FOR REUSE ON THE SITE WHEREVER POSSIBLE.	A4-00327
6.1.2	THE PRACTICE OF REMOVING TOPSOIL FROM A SITE SHOULD BE AVOIDED UNLESS THE SOIL IS CONTAMINATED OR OTHERWISE CANNOT PROVIDE A LONG-TERM BENEFIT TO THE SITE.	A4-00327
6.1.3	ENSURE THAT THE STRIPPING AND RESPREADING OF TOPSOIL IS STAGED SUCH THAT THE DURATION OF EXPOSURE OF THE SUBSOIL IS APPROPRIATE FOR THE SITE'S EROSION RISK.	A4-00327

STOCKPILE MANAGEMENT		STANDARD DRAWING REFERENCE
7.1.1	ENSURE THAT SAND/SOIL/EARTH STOCKPILES ARE NOT LOCATED IN A POSITION WHERE THE MATERIAL COULD CAUSE HARM OR BE WASHED INTO A GUTTER, DRAIN OR WATER BODY, SUCH AS: - ON A ROAD PAVEMENT; - WITHIN AN OVERLAND FLOW PATH; - ADJACENT TO STREAM BANKS; - WITHIN THE CANOPY DRIP ZONE OF PROTECTED TREES (LONG-TERM STOCKPILES).	
FLOW DIVERSION		
7.2.1	ENSURE, WHERE NECESSARY, A FLOW DIVERSION BANK OR CATCH DRAIN IS PLACED UP-SLOPE OF A STOCKPILE TO DIRECT EXCESSIVE OVERLAND FLOW AROUND THE STOCKPILE.	A4-00328
7.2.2	FLOW DIVERSION AROUND SAND/SOIL/EARTH STOCKPILES IS NECESSARY WHEN RAINFALL IS POSSIBLE AND THE UP-SLOPE CATCHMENT AREA EXCEEDS 1500 sq m.	A4-00328
LONG-TERM STOCKPILES		
7.3.1	ENSURE THAT LONG-TERM STOCKPILES OF MATERIAL CONTAINING SOME DEGREE OF CLAYEY MATTER (EG. MOST SOILS, BUT NOT NECESSARILY IMPORTED SAND) ARE: - IDEALLY COVERED WITH AN IMPERVIOUS COVER (NOT ALWAYS PRACTICAL); - COVERED WITH MULCH OR TEMPORARY VEGETATION (GRASS) IF NOT LOCATED WITHIN THE DRAINAGE CATCHMENT OF A SEDIMENT BASIN.	
7.3.2	ENSURE APPROPRIATE DUST CONTROLS EXIST FOR ALL STOCKPILES.	
DOWN-SLOPE SEDIMENT CONTROL		
7.4.1	ENSURE AN APPROPRIATE SEDIMENT CONTROL SYSTEM IS LOCATED DOWN-SLOPE OF SAND/SOIL/EARTH STOCKPILES, SUCH AS: - FILTER FENCE OR COMPOSITE SEDIMENT FENCE (FOR CLAYEY SOILS); - WOVEN SEDIMENT FENCE FOR WASHED SAND; - SEDIMENT BASIN WHEREEVER PRACTICAL.	A4-00329

RECOGNISE AND MANAGE PROBLEMATIC SOILS		STANDARD DRAWING REFERENCE
8.1.1	WITH THE EXCEPTION OF SMALL, LOW-RISK SITES, AN APPROPRIATE SOIL ANALYSIS SHOULD BE PERFORMED ON SITE PRIOR TO COMMENCING ANY SOIL DISTURBANCE.	A4-00330
8.1.2	FROM A CONSTRUCTION PERSPECTIVE, SITE MANAGERS SHOULD BE AWARE OF ANY POTENTIALLY PROBLEMATIC SOILS, SUCH AS HIGHLY ERODIBLE SOILS (WHETHER THE EROSION RISK IS DUE TO THE SOIL COMPOSITION OR LAND SLOPE), DISPERSIVE SOILS, AND ACID SULFATE SOILS.	A4-00330

RECOGNISE AND MANAGE PROBLEMATIC SOILS		STANDARD DRAWING REFERENCE
8.1.3	FROM A REVEGETATION PERSPECTIVE, SITE MANAGERS SHOULD BE AWARE OF ANY SOIL THAT WILL REQUIRE THE ADDITION OF AMELIORANTS PRIOR TO PLANTING, AND ANY SOIL SURFACE THAT IS LIKELY TO EXPERIENCE EXCESSIVE SOIL COMPACTION PRIOR TO BEING REVEGETATED.	A4-00330
DISPERSIVE SOILS		
8.2.1	DISPERSIVE SOILS ARE TO BE IDENTIFIED THROUGH APPROPRIATE PRE-CONSTRUCTION SOIL TESTING, SUCH AS: - EXCHANGEABLE SODIUM PERCENTAGE > 6% - EMERSION AGGREGATE CLASSES 1 TO 5 (NOTE : CLASSES 3(2), 3(1) AND 5 HAVE SLIGHT RISK OF DISPERSIVE PROBLEMS).	A4-00330
8.2.2	A SIMPLE FIELD TEST SUCH AS THE AGGREGATE IMMERSION TEST (REFER STANDARD DRAWING) CAN BE USED AS AN ON-SITE INDICATOR TEST.	A4-00330
8.2.3	DISPERSIVE SOILS MAY ALSO BE IDENTIFIED BY THEIR DISTINCTIVE EROSION PATTERNS.	A4-00330
8.2.4	PRIOR TO THE DISTURBANCE OF SOILS BELOW AN ELEVATION OF 5m AHD, THE SOILS SHOULD BE TESTED FOR THEIR ACID SULFATE POTENTIAL.	A4-00330
8.2.5	POTENTIAL ACID SULFATE SOILS MUST BE MANAGED IN ACCORDANCE WITH STATE APPROVED GUIDELINES, SUCH AS: - QUEENSLAND'S STATE PLANNING POLICY 2/02 GUIDELINE: PLANNING AND MANAGING DEVELOPMENT INVOLVING ACID SULFATE SOILS - Dear, et al., 2002, QUEENSLAND ACID SULFATE SOIL TECHNICAL MANUAL - SOIL MANAGEMENT GUIDELINES	A4-00330
SALINE SOILS		
8.3.1	SALINE SOILS ARE TO BE IDENTIFIED THROUGH APPROPRIATE SOIL TESTING, SUCH AS: - ELECTRICAL CONDUCTIVITY (EC) OF EITHER A 1:5 EXTRACT > 1.5dS/m, OR A SATURATED EXTRACT > 4dS/m	
8.3.2	IF SALINE SOILS ARE DETECTED, REFER TO SUPERINTENDENT, WHO WILL BE REQUIRED TO SEEK EXPERT ADVICE.	
NON-OFFICIAL SOIL TESTS		
8.4.1	SOIL TESTS CONDUCTED ON-SITE CAN ONLY 'INDICATE' THE EXISTENCE OF A POTENTIAL SOIL PROBLEM. SUCH TESTING IS NOT A SUBSTITUTE FOR OFFICIAL SOIL SAMPLING, TESTING AND ASSESSMENT.	
8.4.2	IN HIGH RISK AREAS (IE. SOILS LOWER THAN 5m AHD), PROFESSIONAL SOIL TESTING AND SOIL MANAGEMENT PROCEDURES ARE REQUIRED.	
8.4.3	AN AGGREGATE IMMERSION TEST CAN BE USED AS AN INDICATOR OF POTENTIAL DISPERSIVE SOILS (SODIC SOILS). NOTE THE FOLLOWING: - SLAKING SOILS (SOILS THAT READILY COLLAPSE IN WATER, BUT DO NOT NECESSARILY CLOUD THE WATER) CAN BE JUST AS PROBLEMATIC.	
8.4.4	WHEN USING SOIL pH TESTING, NOTE THE FOLLOWING: - SOIL pH IS AN INDICATOR OF POTENTIAL REVEGATION PROBLEMS; - SOIL pH IS NOT A GOOD INDICATOR OF POTENTIAL ACID SULFATE SOILS;	
8.4.5	THE JAR SETTLING TEST IS A NON-SCIENTIFIC TEST THAT SHOULD ONLY BE USED AS A VISUAL TOOL TO HELP EDUCATE SITE PERSONNEL AS TO THE LIKELY SETTLEMENT PROPERTIES OF THE LOCAL SOIL.	
8.4.6	THE JAR SETTLING TEST IS PERFORMED BY: - FIRST CRUSHING A SOIL SAMPLE AND PLACING IT IN A JAR FILLED WITH DE-IONISED (DISTILLED) WATER; - THE JAR IS THEN SEALED AND SHAKEN AGGRESSIVELY FOR A FEW MINUTES; - FINALLY, THE JAR IS LEFT UNDISTURBED FOR UP TO 5 DAYS TO OBSERVE THE DEGREE OF SETTLEMENT.	
8.4.7	WHEN ANALYSING THE RESULTS OF THE JAR SETTLING TEST, NOTE THE FOLLOWING: - THIS TEST PROVIDES ONLY AN INDICATION OF THE POTENTIAL SEDIMENT SETTLING PROPERTIES; - THE TEST CAN BE USED AS AN INDICATOR OF THE PERCENTAGE FRACTION OF FINE AND COARSE SEDIMENTS WITHIN A SOIL SAMPLE; - A SOIL SAMPLE THAT FAILS TO SETTLE PROPERLY AFTER A DAY OR TWO INDICATES THAT CHEMICAL FLOCCULATION OF SEDIMENT BASINS MAY BE REQUIRED; - SUCH A RESULT ALSO INDICATES THAT EXPERT SOIL ADVICE IS LIKELY TO BE REQUIRED TO ACHIEVE THE DESIRED ENVIRONMENTAL PROTECTION.	
MANAGEMENT OF DISPERSIVE SOILS		
8.5.1	DISPERSIVE SOILS ARE HIGHLY SUSCEPTIBLE TO DEEP, NARROW RILLING (FLUTING) ON SLOPES AND ALONG THE INVERT OF DRAINS.	
8.5.2	DISPERSIVE SOILS MUST BE TREATED (WITH GYPSUM OR THE LIKE), OR BURIED UNDER A MINIMUM 100mm LAYER OF NON-DISPERSIVE SOIL BEFORE PLACING ANY VEGETATION OR EROSION CONTROL MEASURES. THICKER CAPPING WITH NON-DISPERSIVE SOIL MAY BE REQUIRED ON STEEP SLOPES AND IN AREAS WHERE THERE IS LIKELY TO BE FUTURE SOIL DISTURBANCE SUCH AS ON CREEK BANKS.	
8.5.3	AVOID CUTTING DRAINAGE CHANNELS INTO DISPERSIVE SOILS.	
8.5.4	AVOID THE USE OF CHECK DAMS WITHIN ANY DRAIN THAT CUTS INTO DISPERSIVE SOILS, AS THEY EXTEND THE DURATION OF WATER PONDING, AND THUS THE RISK OF EROSION. INSTEAD, LINE THE DRAIN WITH A NON-DISPERSIVE SOIL AND THEN REVEGETATE AS APPROPRIATE.	
8.5.5	DISPERSIVE SOILS ARE HIGHLY SUSCEPTIBLE TO TUNNEL EROSION. SEALING DISPERSIVE SOILS WITH CONCRETE CAN RESULT IN TUNNEL EROSION FORMING UNDER THE CONCRETE. SIMILARLY, TUNNEL EROSION CAN FORM UNDER ROCK AND ROCK MATTRESS CHANNEL LININGS.	
8.5.6	DO NOT DIRECT SEED DISPERSIVE SOILS. A WELL-ESTABLISHED GRASS ROOT SYSTEM CANNOT PREVENT THE RELEASE OF CLAY PARTICLES FROM THE SOIL, AND THE INEVITABLE FAILURE OF THE GRASSED SURFACE. INSTEAD, TREAT THE SOIL WITH GYPSUM (OR THE LIKE), AND/OR COVER THE DISPERSIVE SOILS WITH A MINIMUM 100 TO 300mm OF NON-DISPERSIVE SOIL DEPENDING ON THE LAND SLOPE AND THE LIKELY DEGREE OF FUTURE SOIL DISTURBANCE.	

MANAGEMENT OF TEMPORARY ACCESS ROADS		STANDARD DRAWING REFERENCE
9.1.1	STORMWATER RUNOFF MUST BE ALLOWED TO FREELY DISCHARGE FROM UNSEALED ROADS.	
9.1.2	APPROPRIATE DRAINAGE CONTROLS WILL BE REQUIRED ON ALL UNSEALED ROADS SUBJECT TO RAINFALL, EVEN IF THE ROAD IS TEMPORARY.	

MANAGEMENT OF TEMPORARY ACCESS ROADS		STANDARD DRAWING REFERENCE
9.1.3	GRAVELLING OF LONG-TERM, UNSEALED ROADS CAN SIGNIFICANTLY REDUCE THE RELEASE OF FINE SEDIMENTS AND TURBID WATERS FROM THE ROADWAY.	
OUT-FALL DRAINAGE		
9.2.1	OUT-FALL DRAINAGE IS BEST USED ONLY WHEN CONDITIONS ARE SUITABLE TO DISCHARGE RUNOFF AS SHEET FLOW DOWN THE SLOPE.	
9.2.2	OUT-FALL DRAINAGE CAN CAUSE EROSION PROBLEMS IF: - THE OUTER EMBANKMENT IS UNSTABLE; OR - AN EARTH WINDROW FORMS ALONG THE OUTER EDGE OF THE ROADWAY.	
IN-FALL DRAINAGE		
9.3.1	IN-FALL DRAINAGE IS GENERALLY THE PREFERRED ROAD DRAINAGE SYSTEM, ESPECIALLY WHEN: - THE OUTER ROAD EMBANKMENT CONSISTS OF POOR OR UNSTABLE SOILS; OR - AN EARTH WINDROW IS LIKELY TO FORM ALONG THE OUTER EDGE OF THE ROAD, EG. DURING ONGOING ROAD GRADING OPERATIONS.	
CROSS BANK DRAINAGE		
9.4.1	WHEREVER REASONABLE AND PRACTICABLE, ALLOW STORMWATER TO SHED FROM UNSEALED ACCESS ROADS AT REGULAR INTERVALS.	
9.4.2	TYPICAL SPACING OF CROSS BANKS IS: - 120m FOR ROAD GRADES LESS THAN 2% - 60m FOR ROAD GRADES OF 2 TO 4% - 30m FOR ROAD GRADES OF 4 TO 8% - 15m FOR ROAD GRADES GREATER THAN 8%	
9.4.3	THE OCCURRENCE OF EROSION ON THE ROAD OR WITHIN THE TABLE DRAIN IS A LIKELY INDICATOR OF INSUFFICIENT DRAINAGE CONTROL.	

TEMPORARY SITE SHUTDOWNS		STANDARD DRAWING REFERENCE
10.1.1	PROCEDURES FOR INITIATING A SITE SHUTDOWN, WHETHER PLANNED OR UNPLANNED, MUST INCORPORATE THE REVEGETATION OF ALL SOIL DISTURBANCES UNLESS OTHERWISE APPROVED BY THE SUPERINTENDENT.	
10.1.2	REVEGETATION ACTIVITIES ASSOCIATED WITH A PROGRAMMED SITE SHUTDOWN SHOULD COMMENCE AT LEAST 30 DAYS PRIOR TO THE NOMINATED SHUTDOWN DATE.	
10.1.3	THE USE OF NON-VEGETATED EROSION CONTROLS SUCH AS MULCH, BLANKETS AND SOIL BINDERS IS GENERALLY NOT CONSIDERED ADEQUATE TREATMENT UNLESS: - IT IS KNOWN THAT THE SHUTDOWN PERIOD WILL BE LESS THAN THREE MONTHS; AND - THE PROPOSED SOIL STABILISATION MEASURES ARE APPROPRIATE FOR THE EXPECTED WEATHER CONDITIONS.	
HEAVY MULCHING OF GARDEN BEDS		
10.2.1	FUTURE GARDEN BEDS SHOULD BE PROTECTED WITH HEAVY MULCHING. IT IS NOTED THAT THE INTRODUCTION OF GRASS SEEDING TO THESE GARDEN BEDS CAN CAUSE ONGOING WEED PROBLEMS.	
10.2.2	ADEQUATE DRAINAGE CONTROLS (CATCH DRAINS, LOGS AND LEVEL SPREADERS) WILL BE REQUIRED TO PREVENT LOOSE MULCH BEING WASHED FROM THE SITE. RECESSED LOGS CAN HELP 'DAM' LOOSE MULCH, AND SPREAD SURFACE RUN-OFF.	
TEMPORARY SITE FENCING		
10.3.1	WHERE APPROPRIATE, CONSTRUCTION SITES SHOULD BE FENCED TO REDUCE THE RISK OF ILLEGAL SOIL/RUBBISH DUMPING AND SOIL DISTURBANCE DURING EXTENDED SHUTDOWN PERIODS.	

SITE REHABILITATION		STANDARD DRAWING REFERENCE
11.1.1	EXPOSED SOIL SURFACES MUST BE REHABILITATED AS SOON AS PRACTICAL TO MINIMISE THE RISK OF SOIL EROSION AND THE RESULTING ENVIRONMENTAL HARM.	
11.1.2	AT LEAST 70 TO 80% COVER MUST BE ACHIEVED IN ORDER TO PROTECT THE SOIL SURFACE FROM RAINDROP IMPACT. IN CRITICAL LOCATIONS 100% COVER MAY BE REQUIRED (REFER SUPERINTENDENT ON SITE).	
SOIL ADJUSTMENT		
11.2.1	SOIL SURFACES THAT HAVE EXPERIENCED EXCESSIVE COMPACTION DURING THE CONSTRUCTION PHASE MUST BE SUITABLY SCARIFIED/RIPPED PRIOR TO REVEGETATION.	
11.2.2	SOIL TESTING SHOULD BE USED TO DETERMINE ANY REQUIRED CHEMICAL ADJUSTMENT OF THE SOIL (EG. LIME, GYPSUM, pH ADJUSTMENTS, FERTILISER).	
TURFING		
11.3.1	TURF MUST NOT BE PLACED ON EXCESSIVELY COMPACTED SOILS.	
11.3.2	IF HIGH VELOCITY FLOWS ARE LIKELY/EXPECTED OVER THE TURF AREA WITHIN THE FIRST TWO WEEKS, THEN THE TURF SHOULD BE ANCHORED WITH WOODEN PEGS. METAL STAPLES SHOULD NOT BE USED TO ANCHOR TURF (FOR REASONS OF PEDESTRIAN SAFETY).	
GRASS SEEDING		
11.4.1	IF GRASS SEEDING IS USED, THEN SIGNIFICANT BENEFITS CAN BE OBTAINED FROM THE ADDITION OF A LIGHT MULCH COVER. THE ADDITION OF MULCH WILL REDUCE RAINDROP IMPACT, WATER EVAPORATION, AND TEMPERATURE FLUCTUATION WITHIN THE TOPSOIL.	
11.4.2	THE EFFECTIVE PERCENTAGE COVER ACHIEVED BY NEWLY SEEDED SURFACES CAN BE INCREASED BY MOWING THE GRASS AS SOON AS THE SHOOTS GAIN SUFFICIENT HEIGHT (>50mm).	
11.4.3	ALL SITE REVEGETATION MEASURES SHOULD BE MONITORED, PARTICULARLY AFTER RAINFALL.	

				SURVEY		SCALES (A1)		DRAWN			SIGNED			DATE			DIRECTOR ENGINEERING AND COMMERCIAL INFRASTRUCTURE		STANDARD DRAWING REFERENCE	
				SURVEY FILE No				DESIGNED			SIGNED			DATE						
				LEVEL DATUM				CHECKED			SIGNED			DATE						
				MERIDIAN				MANAGER TECHNICAL SERVICES			ORIGINAL SIGNED BY			DATE						
				FILE NAME		STANDARD DRAWINGS/A1-27001		G. HAWES			RPEQ 5693			13/1/14			DATE		17/1/14	
NO. DATE DESCRIPTION DRAWN APPROVED				AMENDMENTS AND REVISIONS																



STANDARD
EROSION & SEDIMENT CONTROL NOTES
SHEET 2 OF 6

SHEET 2 OF 6
WORKS JOB No.
DRAWING No. **A1-27002** AMEND. **A**