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/** ----- GEOLOGY -----
/**
/** FILE NAME:          Geology.txt
/** AUTHOR:            RENEE SCHICKER
/** CREATED:           30 MARCH 2009
/** MODIFIED:          29 OCTOBER 2009
/**
/** The scripts may be supplied in a more readily useable format if the work is acknowledged
/** CONTACT:          Renee_Schicker@hotmail.com
/**
/** EARLIER SCRIPTS NOW BUILT IN:          CREATED:          LAST UPDATED:
/**          04_Clip.txt          15 DECEMBER 2008          20 MAY 2009
/**          15_Rasterise.txt          30 APRIL 2009          28 MAY 2009
/**
/** STARTS IN:          ARC
/** SCRIPT USED BY:     00_MASTER.txt
/** USES THE SCRIPT:    CheckProgEdit.txt      (CREATED: 02 MARCH 2009)
/**                   05a_JOIN_QMAPs.txt
/**
/** COVERAGES USED:
/**          nzgeology      D:\renee_GIS\input_data\nzgeology
/**          geol_units(W)  D:\renee_GIS\input_data\GNS_QMAP\Waikato\covers\geol_units
/**          geol_units(A)  D:\renee_GIS\input_data\GNS_QMAP\Auckland\covers\geol_units
/**          mask_rotorua   D:\Renee_GIS\Output_data\Organised\02_Setup\mask_rotorua
/**          dem_bnd        D:\Renee_GIS\Output_data\Organised\03_DEM\DEM_Bnd
/**
/** COVERAGES MADE:      Rotorua_geol          QMAP_A_Geol_u
/**                   QMAP_W_Geol_u          qmap_geol (in JOIN_QMAPS.txt)
/**                   reg_geol              Waik_geol
/**                   geoltest
/**
/** GRIDS MADE:          GeolGrid
/**
/** CLASSES MADE:
/**                   Alluvium          Alternating sandstone/siltstone
/**                   Andesite, dacite and diorite          Basalt
/**                   Engineering Soils          Greywacke, argillite and Chert
/**                   Ignimbrite and Tuff          Laharic colluvium
/**                   Limestone          Mudstone
/**                   Rhyolite          Sandstone
/**                   Water
/**
/** PURPOSE:             Simplify geology for the Waikato region in order to reduce the
/**                   number of classes for the statistical process.
/**                   Now includes the combining of QMAP data (obtained 9 MARCH 2009)
/**                   for Auckland and Waikato (done in the JOIN_QMAPS script but run
/**                   from this script) and combining the combined QMAPs with the Rotorua
/**                   portion (using nzgeology data) not currently covered by QMAP. Once
/**                   combined the classifications are simplified in the reg_geol layer.
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/** FUNCTIONS USED:      &CALL          &ROUTINE          &RETURN
/**                      &IF &THEN      [EXIST]           KILL
/**                      CLIP            &TYPE             &RUN (&R)
/**                      EDITCOVER (EC)   EDITFEATURE (EF)  SELECT
/**                      CALCULATE        SAVE              QUIT (Q)
/**                      UNION            ADDITEM           DISSOLVE

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/** ..... SOME HISTORY.....

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/** 15 DECEMBER 2008      3_clip.txt and 4_simplify_geol.txt individual scripts of the processes
/**                      specifically made to be run from a master script (0_parent.txt)
/**                      without having any of its content repeated in the master script (and
/**                      specifically for Waikato region)
/** 12 FEBRUARY 2009      Can now clip with the digitised regional boundary I made (which has
/**                      a more representative coast line than the EW one) based on the
/**                      district boundaries layer and cut off points based on the EW layer
/** 02 MARCH 2009         Added &RUN CheckProgEdit.txt process to save rewriting it again.
/** 11 MARCH 2009         Renamed 3_clip.txt as 04_Clip.txt. Now run from 00_MASTER.txt
/**                      instead of 0_parent.txt.
/** 12 MARCH 2009         Changed file name from 4_simplify_geol.txt to 05_Simpl_Geol.txt.
/**                      Now runs from 00_MASTER.txt instead of 0_parent.txt.
/** 13 MARCH 2009         Modified clip geology, to clip the Auckland and Waikato QMAP data
/**                      to the region, and the area missing in QMAP (Rotorua still being
/**                      developed) being covered by the nzgeology coverage clipped by the
/**                      mask I created (based on the existing extent of the 2 QMAP covers)
/**                      and then clipping to the region by clipping with region_bnd. The
/**                      initial region_geol clip (based on nzgeology coverage) no longer
/**                      applies.
/** 16 MARCH 2009         05_RSmpl_Geol.txt version created as only the Rotorua part of
/**                      nzgeology coverage is being used (the rest is from QMAP coverages)
/**                      Have to refine the reclassification to suit geology in this area.
/**                      Will keep the initial 05_Simpl_Geol.txt in a folder with other
/**                      now excluded scripts.
/**                      No longer need the reclassifications as: Mudstone; Peat; Siltstone.
/**                      No longer need Diorite (was part of Andesite and Dacite
/**                      reclassification); Sandstone (only need 1 of 4 = Calcareous
/**                      sandstone and siltstone...); Basalt (only need 1 of 3 = Basalt of
/**                      volcanoes, flows, and scoria cones); Recent Sediments (only need
/**                      Lake silt, don't need dune sand or marine gravel).
/**                      Modified the clip geology part again so it can use the QMAP data
/**                      without the need to create copies with different names (follow file
/**                      path).
/** 30 MARCH 2009         Added JOIN_QMAPs as a routine to run the existing
/**                      JOIN_QMAPS.txt script and union it with what was
/**                      04_RSmpl_Geol.txt and modified the classifications to tie them
/**                      together a bit better. Recent Sediments is now Engineering soils
/**                      (Lake Silt, sand, breccia, fill). Andesite, Dacite and Diorite are classed
/**                      together. Greywacke and Argillite are another class. All others have
/**                      not been changed from ROCK_GROUP classification or what
/**                      04_RSmpl_geol.txt classed them as. Had to fix Rotorua classification,
/**                      added a routine to classify before union, as it lead to QMAP areas
/**                      being wrongly classed as water. Have now renamed as

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/** 27 APRIL 2009 05_geology.txt. Will need to fix the Rotorua_mask shapefile as there
/** is a sliver undefined have temporarily made it the last edit as
/** Alluvium. Would be more appropriate to modify the shapefile [HAS
/** SINCE BEEN FIXED – See below].
/** Wrote out the purpose, and checked everything was up to date and
/** consistent. Have fixed/ re-edited the Rotorua_mask shapefile to
/** snap to any vertex of the Auckland and Waikato QMAP layers
/** present along the boundary where Rotorua would be (no more
/** sliver).
/** 30 APRIL 2009 First attempt to rasterise vector data using POLYGRID, as a result I
/** created the 15_Rasterise.txt script to convert Covers to Grids.
/** 06-10 MAY 2009 (in 15_Rasterise.txt) Added an additional step to rasterising text
/** type polygon data - pseudo code assigned to each parameter's class,
/** making water 0 where possible. This works now, just have to Add a
/** field to the GRID and make the text edits in ArcMap (this works so
/** long as the raster data is an integer type, can't access attribute table
/** if it is a float type).
/** 12 MAY 2009 Added KILL_TEMP ROUTINE to Join_QMAPs.txt
/** 20 MAY 2009 (04_Clip.txt) Separate Input data and output data directories, so
/** workspace is set to a separate output folder, so reduces the chance
/** of deleting input data by accident.
/** 28 MAY 2009 In further Reclassifying, have added Tuff to Ignimbrite (class now:
/** Ignimbrite and tuff), Peridotite is grouped in with andesite, dacite
/** and diorite, and Chert has been grouped with greywacke and
/** argillite (now Greywacke, argillite and chert).
/** Modifications here were carried across to 15_Rasterise.txt.
/** 10 JUNE 2009 Added clip routine, make 04_clip.txt redundant.
/** Added Rasterise routine, make 15_Rasterise.txt redundant.
/** Renamed add_rotorua routine as Classify_all. Added list of functions
/** used. Now clip by DEM_Bnd instead of region_bnd.
/** Renamed JOIN_QMAPs.txt to 05a_JOIN_QMAPs.txt
/** 30 SEPTEMBER 2009 Added separate workspaces for each script, so have to add file path
/** to find input files, also corrected input and output sections.
/** 28 OCTOBER 2009 Fixed a few classes, so now have 13 classes instead of 17. Had some
/** problems with QMap Rock_Group and Main_Rock classifications not
/** really matching up. Led to some odd susceptibility in Hauraki plains
/** with mud being classed as Mudstone. Have gone through all geology
/** classes and have made the appropriate changes. Debris, and Tephra
/** (formerly Rock_GROUP = Unknown) are now Engineering Soils, so
/** are Sand, Clay, Mud, and Gravel (formerly Rock_GROUP =
/** Conglomerate). Sinter (formerly Rock_GROUP = Unknown) and
/** Scoria are now Basalt. Pumiceous pyroclastics have now been
/** lumped in with Ignimbrite and tuff. Peat (formerly Rock_GROUP =
/** Mudstone) is now Alluvium.
/** 29 OCTOBER 2009 In 05a_JoinQMAPs.txt added some special edits based on
/** DESCRIPTION to distinguish between some Alluvium and
/** Engineering Soils classes and STRAT_UNIT (= Newcastle Group)
/** to separate older "siltstone" from "mudstone" by classifying as
/** "Argillite". Peat is now in its own class.
/**
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/**

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&CALL Clip
&CALL Join_QMAPs
&CALL Rotorua_h2o
&CALL Classify_all
&CALL Rasterise
&RETURN
/*****
&ROUTINE clip

&IF [EXIST rotorua_geol -cover] &THEN KILL rotorua_geol
&IF [EXIST QMAP_W_geol_u -cover] &THEN KILL QMAP_W_geol_u
&IF [EXIST QMAP_A_geol_u -cover] &THEN KILL QMAP_A_geol_u

/* ROTORUA PART not covered by QMAP
/* Clip NZGEOLOGY to Rotorua area
&IF [EXIST mask_geol -cover] &THEN KILL mask_geol
CLIP D:\renee_GIS\input_data\nzgeology
D:\Renee_GIS\Output_data\Organised\02_Setup\mask_Rotorua mask_geol POLY
&TYPE nzgeology clipped to Rotorua mask area, and mask_rotorua cover deleted.

/* Clip rotorua mask area geol to region_bnd
&IF [EXIST rotorua_geol -COVER] &THEN KILL rotorua_geol
CLIP mask_geol D:\Renee_GIS\Output_data\Organised\03_DEM\DEM_Bnd rotorua_geol POLY 1

&IF [EXIST mask_geol -cover] &THEN KILL mask_geol
&TYPE rotorua mask area clipped to waikato boundary

/* WAIKATO QMAP AREA (Western part of Waikato)
/* CLIP QMAP Waikato geol_units to region_bnd
&IF [EXIST QMAP_W_Geol_u -COVER] &THEN KILL QMAP_W_Geol_u
CLIP D:\renee_GIS\input_data\GNS_QMAP\Waikato\covers\geol_units
D:\Renee_GIS\Output_data\Organised\03_DEM\DEM_Bnd QMAP_W_Geol_u POLY 1
&TYPE GNS QMAP Waikato geology clipped to region_bnd

/* AUCKLAND QMAP AREA (Northern part of Waikato)
/* CLIP QMAP Auckland geol_units to region_bnd
&IF [EXIST QMAP_A_Geol_u -COVER] &THEN KILL QMAP_A_Geol_u
CLIP D:\renee_GIS\input_data\GNS_QMAP\Auckland\covers\geol_units
D:\Renee_GIS\Output_data\Organised\03_DEM\DEM_Bnd QMAP_A_Geol_u POLY 1
&TYPE GNS QMAP Auckland geology clipped to region_bnd
&RETURN

/*****
&ROUTINE Join_QMAPs
&TYPE ROUTINE Join_QMAPs
&R d:\renee_gis\scripts\05a_JOIN_QMAPS.txt
&RETURN
/*****
&ROUTINE Rotorua_h2o
&TYPE ROUTINE Rotorua_h2o
&RUN d:\renee_gis\scripts\CheckProgEdit.txt /* Need to use ArcEdit so run the script to do this

```

```
EC Rotorua_geol          /* Edit Coverage function used to edit region_lith coverage
EF polygon                /* Edit Feature
```

```
&TYPE Rotorua Geology = lake to Lith = Water
SELECT for GEOLOGY = 'lake'
CALCULATE LITH = 'Water'
SAVE
```

```
Q
&RETURN
```

```
/******
```

```
&ROUTINE Classify_all
&TYPE ROUTINE Classify_all
&IF [EXIST reg_geol -COVER] &THEN KILL reg_geol
```

```
UNION Rotorua_geol qmap_geol reg_geol
```

```
DROPITEM reg_geol.pat reg_geol.pat simple_lith
ADDITEM reg_geol.pat reg_geol.pat simple_lith 319 35 C
```

```
&RUN d:\renee_gis\scripts\CheckProgEdit.txt /* Need to use ArcEdit so run the script to do this
```

```
EC reg_geol          /* Edit Coverage function used to edit region_lith coverage
EF polygon            /* Edit Feature
SELECT ALL
```

```
/* ..... ROTORUA LOT .....
```

```
&TYPE ALLUVIUM...
SELECT for LITH = 'Alluvial sand and gravel of high inland terraces'
CALCULATE simple_lith = 'Alluvium'
SELECT for LITH = 'Alluvium'
CALCULATE simple_lith = 'Alluvium'
&TYPE Alluvium (x2) classified as 'Alluvium'
```

```
&TYPE ANDESITE, DACITE AND DIORITE...
/*      I INITIALLY CLASSED AS ANDESITE....
SELECT for LITH = 'Andesite of dissected volcanoes and flows; agglomerate and breccia'
CALCULATE simple_lith = 'Andesite, dacite and diorite'
SELECT for LITH = 'Andesite of flows; andesitic breccia and agglomerate, in part hydrothermally
altered'
CALCULATE simple_lith = 'Andesite, dacite and diorite'
SELECT for LITH = 'Andesite of volcanoes and flows; agglomerate and breccia'
CALCULATE simple_lith = 'Andesite, dacite and diorite'
&TYPE Andesites (x3) classed as 'Andesite, dacite and diorite'
/*      I INITIALLY CLASSED AS DACITE
SELECT for LITH = 'Dacite of dissected domes and flows'
CALCULATE simple_lith = 'Andesite, dacite and diorite'
```

SELECT for LITH = 'Dacite of domes and flows'  
CALCULATE simple\_lith = 'Andesite, dacite and diorite'  
SELECT for LITH = 'Deeply weathered flow dacite'  
CALCULATE simple\_lith = 'Andesite, dacite and diorite'  
&TYPE Dacites (x3) classed as 'Andesite, dacite and diorite'

&TYPE BASALT...

SELECT for LITH = 'Basalt of volcanoes, flows, and scoria cones'  
CALCULATE simple\_lith = 'Basalt'  
&TYPE 'Basalt of volcanoes, flows, and scoria cones' classified as 'Basalt'

&TYPE GREYWACKE AND ARGILLITE (INCLUDES PELITIC SCHIST)...

/\* I INITIALLY CLASSED AS GREYWACKE AND ARGILLITE  
SELECT for LITH = 'Greywacke and argillite (partly alternating with graded greywacke), minor spilitic tuff and lava, chert, limestone, manganese-bearing rocks'  
CALCULATE simple\_lith = 'Greywacke, argillite and chert'  
/\* I INITIALLY CLASSED AS PELITIC SCHIST  
SELECT for LITH = 'Chlorite Subzone II pelitic schist, phyllite, deformed conglomerate, with steeply-plunging lineation'  
CALCULATE simple\_lith = 'Greywacke, argillite and chert'  
&TYPE Greywacke and argillite (x1) and Pelitic Schist (x1) classified as 'Greywacke and argillite'

&TYPE IGNIMBRITE...

SELECT for LITH = 'Ignimbrite and associated ash-flow tuff, dominantly rhyolitic'  
CALCULATE simple\_lith = 'Ignimbrite and tuff'  
SELECT for LITH = 'Ignimbrite and associated ash-flow tuff, rhyolitic to dacitic'  
CALCULATE simple\_lith = 'Ignimbrite and tuff'  
&TYPE Ignimbrite (x2) classified as 'Ignimbrite'  
SELECT for LITH = 'Pumiceous pyroclastics'  
CALCULATE simple\_lith = 'Ignimbrite and tuff'  
&TYPE 'Pumiceous pyroclastics' classed as 'Ignimbrite and tuff'

&TYPE LAHARIC COLLUVIUM...

SELECT for LITH = 'Laharic andesitic colluvium'  
CALCULATE simple\_lith = 'Laharic colluvium'  
SELECT for LITH = 'Laharic colluvium'  
CALCULATE simple\_lith = 'Laharic colluvium'  
&TYPE Laharic colluvium (x2) classified as 'Laharic colluvium'

&TYPE RHYOLITE...

SELECT for LITH = 'Rhyolite of dissected domes and flows'  
CALCULATE simple\_lith = 'Rhyolite'  
SELECT for LITH = 'Rhyolite of domes and flows'  
CALCULATE simple\_lith = 'Rhyolite'  
&TYPE Rhyolite (x2) classified as 'Rhyolite'

&TYPE SANDSTONE...

SELECT for LITH = 'Calcareous sandstone and siltstone (partly alternating with graded sandstone), pumiceous and andesitic tuff, limestone'  
CALCULATE simple\_lith = 'Sandstone'  
&TYPE 'Calcareous sandstone and siltstone...' classified as 'Sandstone'

&TYPE ENGINEERING SOILS...

SELECT for LITH = 'Lake silt'

CALCULATE simple\_lith = 'Engineering Soils'

&TYPE Lake Silt classified as Engineering Soils

&TYPE WATER...

SELECT for LITH = 'Water'

CALCULATE simple\_lith = 'Water'

/\*..... QMAP LOT .....

&TYPE ALLUVIUM...

SELECT for ROCK\_GROUP = 'Alluvium'

CALCULATE simple\_lith = 'Alluvium'

&TYPE ALTERNATING SANDSTONE/SILTSTONE...

SELECT for ROCK\_GROUP = 'Alternating sandstone/siltstone'

CALCULATE simple\_lith = 'Alternating sandstone/siltstone'

&TYPE ANDESITE, DACITE AND DIORITE...

SELECT for ROCK\_GROUP = 'Andesite'

CALCULATE simple\_lith = 'Andesite, dacite and diorite'

SELECT for ROCK\_GROUP = 'Diorite'

CALCULATE simple\_lith = 'Andesite, dacite and diorite'

SELECT for ROCK\_GROUP = 'Peridotite'

CALCULATE simple\_lith = 'Andesite, dacite and diorite'

&TYPE BASALT...

SELECT for ROCK\_GROUP = 'Basalt'

CALCULATE simple\_lith = 'Basalt'

&TYPE ENGINEERING SOILS...

SELECT for ROCK\_GROUP = 'Engineering Soils'

CALCULATE simple\_lith = 'Engineering Soils'

&TYPE GREYWACKE AND ARGILLITE (INCLUDES PELITIC SCHIST)...

SELECT for ROCK\_GROUP = 'Argillite'

CALCULATE simple\_lith = 'Greywacke, argillite and chert'

SELECT for ROCK\_GROUP = 'Greywacke'

CALCULATE simple\_lith = 'Greywacke, argillite and chert'

SELECT for ROCK\_GROUP = 'Chert'

CALCULATE simple\_lith = 'Greywacke, argillite and chert'

&TYPE IGNIMBRITE...

SELECT for ROCK\_GROUP = 'Ignimbrite'

CALCULATE simple\_lith = 'Ignimbrite and tuff'

SELECT for ROCK\_GROUP = 'Tuff'

CALCULATE simple\_lith = 'Ignimbrite and tuff'

&TYPE LIMESTONE...

```
SELECT for ROCK_GROUP = 'Limestone'
CALCULATE simple_lith = 'Limestone'
```

```
&TYPE MUDSTONE...
SELECT for ROCK_GROUP = 'Mudstone'
CALCULATE simple_lith = 'Mudstone'
```

```
&TYPE PEAT...
SELECT for ROCK_GROUP = 'Peat'
CALCULATE simple_lith = 'Peat'
```

```
&TYPE RHYOLITE...
SELECT for ROCK_GROUP = 'Rhyolite'
CALCULATE simple_lith = 'Rhyolite'
```

```
&TYPE SANDSTONE...
SELECT for ROCK_GROUP = 'Sandstone'
CALCULATE simple_lith = 'Sandstone'
```

```
&TYPE WATER...
SELECT for ROCK_GROUP = 'Water'
CALCULATE simple_lith = 'Water'
&TYPE Water Bodies identified, although not Lithology
&TYPE All lithologies simplified
```

```
SAVE
Q
```

```
&IF [EXIST Waik_geol -COVER] &THEN KILL Waik_geol
/*Combine neighbouring polygons of the same class_name
DISSOLVE reg_geol Waik_geol simple_lith POLY
```

```
&RETURN
```

```
/*****
```

```
&ROUTINE Rasterise
&IF [EXIST geoltest -COVER] &THEN KILL geoltest
COPY Waik_geol geoltest
DROPITEM geoltest.pat geoltest.pat code_num
ADDITEM geoltest.pat geoltest.pat code_num 5 5 I
&RUN d:\renee_gis\scripts\CheckProgEdit.txt
```

```
EC geoltest
EF polygon
```

```
SELECT for simple_lith = 'Water'
CALCULATE code_num = 0
SELECT for simple_lith = 'Alluvium'
CALCULATE code_num = 1
SELECT for simple_lith = 'Alternating sandstone/siltstone'
CALCULATE code_num = 2
```



```
SELECT for simple_lith = 'Andesite, dacite and diorite'
CALCULATE code_num = 3
SELECT for simple_lith = 'Basalt'
CALCULATE code_num = 4
SELECT for simple_lith = 'Engineering Soils'
CALCULATE code_num = 5
SELECT for simple_lith = 'Greywacke, argillite and chert'
CALCULATE code_num = 6
SELECT for simple_lith = 'Ignimbrite and tuff'
CALCULATE code_num = 7
SELECT for simple_lith = 'Laharic colluvium'
CALCULATE code_num = 8
SELECT for simple_lith = 'Limestone'
CALCULATE code_num = 9
SELECT for simple_lith = 'Mudstone'
CALCULATE code_num = 10
SELECT for simple_lith = 'Peat'
CALCULATE code_num = 11
SELECT for simple_lith = 'Rhyolite'
CALCULATE code_num = 12
SELECT for simple_lith = 'Sandstone'
CALCULATE code_num = 13
SAVE
Q
```

```
&IF [EXIST GeolGrid -GRID] &THEN KILL GeolGrid ALL
POLYGRID geoltest GeolGrid code_num
25
Y
```

```
&RETURN
```