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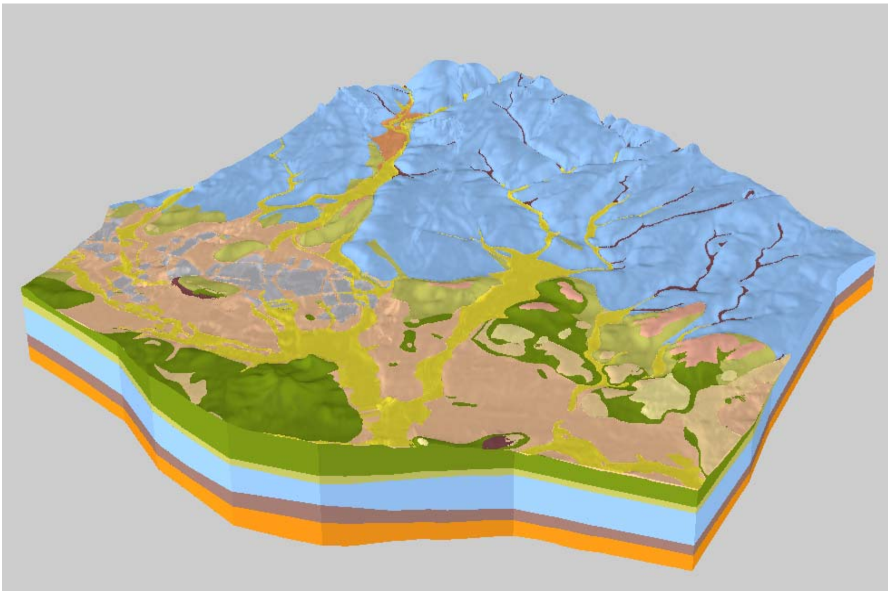
Model Metadata Report for a 3d Model of Cirencester-Cricklade

Geological Modelling Systems Programme

Internal Report IR/13/021



BRITISH GEOLOGICAL SURVEY

GEOLOGICAL MODELLING SYSTEMS PROGRAMME

INTERNAL REPORT IR/13/021

Model Metadata Report for a 3d Model of Cirencester-Cricklade

S Thorpe, D Morgan

Keywords

GSI3D; Cirencester; 3d Model.

National Grid Reference

SW corner 400000,191817
NE corner 415905,206060

Map

Sheet 235, 1:50 000 scale, Cirencester

Front cover

View of Cirencester 3d model from SE corner looking NW.

Bibliographical reference

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Foreword

This report publishes the metadata of a 3d modelling study by a BUFI student which subsequently was then formalised by British Geological Survey (BGS) modelling staff. As the model was created by a visiting student no accurate metadata was maintained during the project set-up period. This document aims to publish all known metadata and indicates where uncertainty of source arises. The model was given to BGS after the initial student completion phase to allow the in-house modelling team to bring the model into line with BGS best practice. The model was developed under the 3d Models for Teaching team, part of the Geological Modelling Systems program at BGS. 3D geological models have great potential as a resource for universities when teaching foundation geological concepts as it allows the student to visualise and interrogate UK geology. They are especially useful when dealing with the conversion of 2D field, map and GIS outputs into three dimensional geological units, which is a common problem for all students of geology. Today's earth science students use a variety of skills and processes during their learning experience including the application of schema's, spatial thinking, image construction, detecting patterns, memorising figures, mental manipulation and interpretation, making predictions and deducing the orientation of themselves and the rocks. 3D geological models can reinforce spatial thinking strategies and encourage students to think about processes and properties, in turn helping the student to recognise pre-learnt geological principles in the field and to convert what they see at the surface into a picture of what is going on at depth.

Acknowledgements

A number of individuals have contributed to the project. This assistance has been received at all stages of the study. In addition to the collection of data, many individuals have given their advice, and provided local knowledge. We would particularly like to thank the following:

Ashley Mehaffy BUFI student – Beauchamp College

Emma Ward

Ricky Terrington

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Summary

This report summarises the data and information used in the construction of the model of Cirencester, and the procedures and standards used to ensure its integrity.

1 Modelled volume, purpose and scale

A model of the artificial ground within the gravel working of Cirencester was conceived by Ashley Mehaffy for his BUFI grant. It included the upper bedrock units in addition to the superficial and worked ground areas. The model was completed in a limited amount of time, and as such wasn't produced to the exacting standards of other BGS 3d models. After Mehaffy had completed his project the model was given across to the modelling team allowing it to be formalised and this was completed in 2012-13. The area (Figure 1) shows the project boundary together with the bedrock and superficial geology constructed in the final 3d model. The project sits along a series of river terraces aside the River Thames, these in turn overlie the bedrock geology which comprises the Jurassic limestones and mudstones.

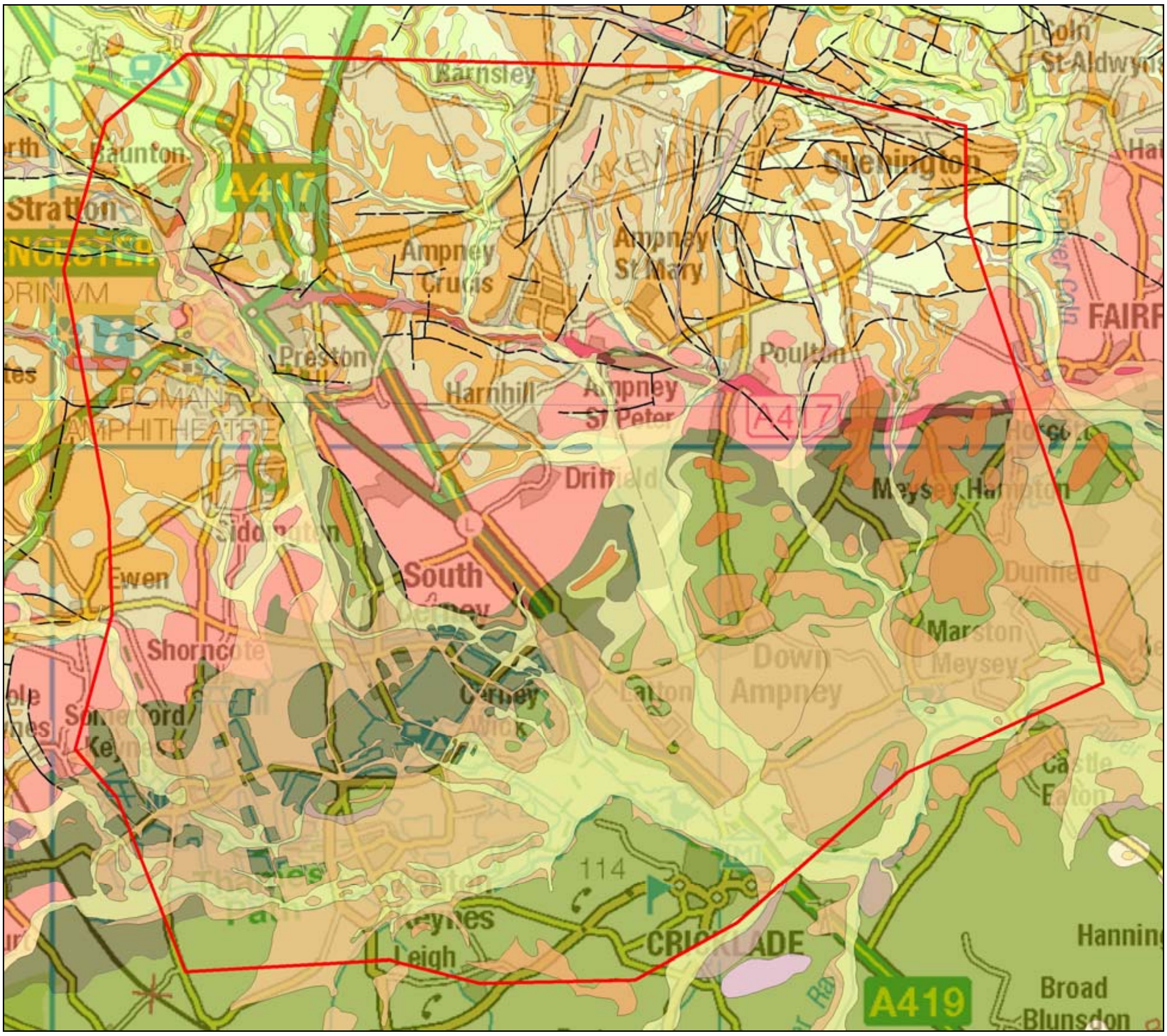

Figure 1 - Geology of Cirencester area

2 Modelled surfaces/volumes

The model represents the currently mapped 50k scale bedrock geology. The units modelled are:

- Worked Ground – all gravel extractions through the gravel river terraces
- Alluvium
- River Terrace Deposits, undifferentiated
- First River Terrace Deposits
- Second River Terrace Deposits
- Third River Terrace Deposits
- Fourth River Terrace Deposits
- Head
- Oxford Clay Formation
- Kellaways Formation

- Great Oolite Group
- Fullers Earth Formation
- Inferior Oolite Group

3 Modelled faults

Although the model was generated using the 'superficial engine' (i.e. no faulting was generated) some faults were described as steps in the cross-sections. Figure 2 shows a cross-section with such a stepped fault. These units still calculate the geological units as a whole block but honour the fault throw.

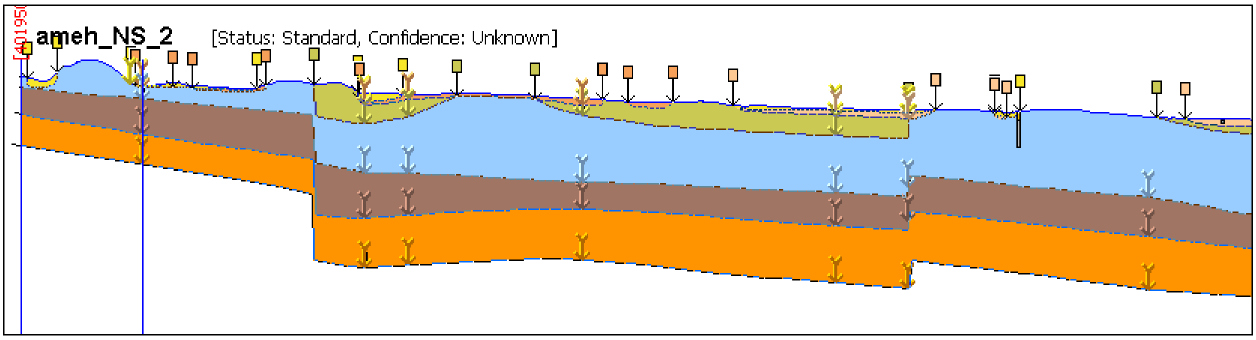

Figure 2 - Cross-section showing stepped faulting

4 Model datasets

Derivation and processing of (including date and by whom):

- DTM – 25m cell resolution was used. (This was created by Mehaffy and no source data exists for its generation)
- Borehole data – extracted using DGSM
- Map data – 50k DigMapGB clipped from the corporate files
- Sheets 235 (Cirencester) & 252 (Swindon) were consulted along with the cross-sectional detail held on these maps
- GVS and GLEG – these files contain the stratigraphical order and colours needed to display the model. These can be found in the Appendix below.

5 Model development log

NB: This section of log records only the details from the point when Mehaffy passed the model back to the BGS modelling team

S Thorpe 31st August 2011

S Thorpe picked up Ashley Mehaffy's Cirencester model (student from early 2011) in order that a Lithoframe Viewer model is created for inclusion on the 3D Models for Teaching website. After loading the model and getting used to the geology etc, Steve was able to pick out some areas that needed a bit of work to get them tidier.

1) There is a large alluvial tract and several smaller branches with a combined River terrace deposit (in some areas there are a number of terraces). These gravelly deposits should sit under the alluvium in areas and this has not been done.
2) Sections have been drawn AROUND river terrace deposits instead of through them, which hinder the model calculation.
3) The depths of these gravel/alluvium areas needs to be checked, as once calculated it looks like the deposits aren't deep enough to create a valley fill
4) A few of the worked ground areas are missing. In fact a full review of the cross-section versus envelopes might reveal some mismatches
5) The biggest problem (if it is indeed a true problem) is that Mehaffy uses several lines instead of just one to create a single cross-sectional interpretation. This results in small glitches where two lines of the same unit do not match entirely, leading to an untidy model and increase in model size.
6) Some envelopes aren't interpreted correctly in cross-section. For example a buried Head deposit is represented at the surface on cross-section "ameh_NS_2"

Further quality checks need to be performed and more time put into this model to bring it up to the BGS standards.

5th September 2011 – S Thorpe

Began to clean a few of the sections, by making the lines into one single correlation, amended the polygons for the central RTD1 envelope and tidied some of the alluvium and river terraces in section.

Also removed some of the extraneous cross-sections that Mehaffy has used to define the smaller terraces. These don't add any modelling value (in fact they make it more difficult for the computer to create regular triangles).

Added STHORPE_ALV_Helper to provide some base data to the alluvial tract running north-south in the eastern section of the model.

26th Sep 2011 – Cross-section N_S_4 bears no resemblance to the geology that the model is trying to reproduce (the units are formational or lower, whereas the model tends to be Group level information). The cross-section was amended to subsume these smaller units into the group level (where known and necessary for the calculation)

Cross-section S_C_E_W_4 removed due to confusion of the calculation, the units are not those that are being modelled.

13th June 2012

Further work on this model was begun to get it completed and onto the website. This involved recreating the model in GSI3D v2012 to allow the publishing of the model in the LFV software.

Simplified the GVS and GLEG. Added proper names for all units. Added envelopes for Oxford Clay and Kellaways Formations and begun correlating them in cross-sections ameh_NS1 to 5 and ameh_EW 1to 5.

20th June 2012
Continued to tidy and join correlation lines within each of Mehaffy's initial sections. Leaving the additional sections that he created (to guide smaller thinner units eg WGR, ALV etc) until the bedrock calculates correctly.
Also removed all circular cross-sections that fall outside the "model_DTM" area.

July-Sept 2012-09-05
Dave Morgan took over task of tidying up the model.

-Reviewed existing sections and made corrections & changes.
Sections named DM_ameh_Ciren_v4_....gsipr.
-Sections around alluvium and terrace polygons deleted.
- Created 'helper' sections along alluvium/river terraces.
- After discussion with Mark Barron, decided to remove RTD where it underlies alluvium in the upper reaches of small valleys (_v4_47 onwards).
Head not modelling correctly. Due to upper/lower case differences? This was indeed the problem. Entries in gsipr file changed, and Head was modelled. Saved as v68 onwards.
Head moved down GVS to below river terraces. Saved to DM_Cirencesterv4.GVS on Dave's N drive – no write permission on W: drive for Cirencester model. v80+

11th Jan 2013 STHorpe
Final review of model before passing across to be formally approved

- GVS shows HEAD as sitting at the top of the strat column, model appears to have it sitting beneath River Terraces. Am checking with DM.
- Amended Alv_helper_12_DM to extend beyond edge and help with constraining river terraces in south of model
- Extended ALV_helper_23_DM to west of model boundary to help constrain smaller discreet envelopes of superficial as well as improve the bedrock
- Extended ALV_helper_33_DM to west of model boundary to help constrain smaller discreet envelopes of superficial as well as improve the bedrock
- Amended First River Terrace in higher reaches of river valley at 402487, 198834 as no evidence suggests that it is present and makes calculation smoother.
- Alluvium and River Terraces don't interact consistently. Some areas are underlain by a River Terrace that has no evidence, others don't have a river terrace where it is obvious that there should be one. For example:

River terrace is cut out by Worked Ground but should continue northeast in this image as the gravels should underlie the Alluvium. To go through all the model would be too time-consuming so a remark in the report will be made and if there is extra time at a later date, this could be reviewed.

- New section – WGR_helper_53_ST – added to constrain shallow terrace and worked ground relationship

Further refinement needed STHORPE Week commencing 29/3/13

Amendments to extant sections:

Alv_helper_31_DM – extended southwards to constrain small bedrock high, and surrounding river terrace.
Alv_helper_20_DM – extended Northeast to constrain further bedrock highs.

6 Model workflow

The model was generated using the standard GSI3D workflow for superficial geological models. This was loosely interpreted by Mehaffy, which resulted in some differing practices being employed, such as drawing cross-sections to define the outline of worked ground polygons and river terraces. From August 2011 S Thorpe employed a more standard BGS methodology. This included amending the directions of some of these cross-sections, and removing those that hindered the calculation.

7 Model limitations

- There is more work that needs to be put into the relationships of the Alluvium and River Terrace Deposits. These are inconsistently modelled.

Appendix

Table 1 - GVS used in the Cirencester 3d Model

name	id	Lithostrat	Lithology	Age	Description
wgr	1	WGR	VOID	Holocene	Worked Ground (Undivided)
Worked Ground	2	WGR	VOID	Holocene	Worked Ground (Undivided)
wmgr	5	WMGR	ARTDP	Holocene	Infilled Ground
Worked and Made Ground	6	WMGR	ARTDP	Holocene	Infilled Ground
soil	10	SOIL	SOIL	Holocene	Soil
alv_1	15	ALV1	ZCS	Holocene	Alluvium
Alluvium	20	ALV1	ZCS	Holocene	Alluvium
rtdu	25	RTDU	SV	Holocene	River Terrace Deposits
River Terrace Deposits Undifferentiated	30	RTDU	SV	Holocene	River Terrace Deposits
rtd1	35	RTD1	SV	Holocene	River Terrace Deposits
First River Terrace Deposits	40	RTD1	SV	Holocene	River Terrace Deposits First Terrace
rtd2	45	RTD2	SV	Holocene	River Terrace Deposits
Second River Terrace Deposits	50	RTD2	SV	Holocene	River Terrace Deposits Second Terrace
rtd3	55	RTD3	SV	Holocene	River Terrace Deposits
Third River Terrace Deposits	60	RTD3	SV	Holocene	River Terrace Deposits Third Terrace
rtd4	65	RTD4	SV	Holocene	River Terrace Deposits
Fourth River Terrace Deposits	70	RTD4	SV	Holocene	River Terrace Deposits Fourth Terrace
slip	80	SLIP	UNKN		Landslips
Head	82	HEAD	SVCL	Holocene	Head Deposits

oxc	85	OXC	MDST	Jurassic	Oxford Clay Formation, undivided: 2 POLYS
Oxford Clay Formation	90	OXC	MDST	Jurassic	Oxford Clay Formation, undivided: 2 POLYS
klb	95	KLB	SDSM	Jurassic	KELLAWAYS FORMATION
Kellaways Formation	100	KLB	SDSM	Jurassic	KELLAWAYS FORMATION
gog	105	GOG	LMST	Jurassic	21 POLYS: all on Gloucester
Great Oolite Group	110	GOG	LMST	Jurassic	Great Oolite Group
fe	115	FE	MDST	Jurassic	FULLER'S EARTH FORMATION
Fullers Earth Formation	120	FE	MDST	Jurassic	FULLER'S EARTH FORMATION
ino	125	INO	OOLM	Jurassic	1 POLY; INFERIOR OOLITE GROUP, on 234, is OK
Inferior Oolite Group	130	INO	OOLM	Jurassic	Inferior Oolite Group

Table 2 - GLEG used in the Cirencester 3d Model

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KPGR	DESCRIPTION	237	224	201	255	TEXTURES\vs.jpg
LASI	DESCRIPTION	255	237	0	255	TEXTURES\zc.jpg
LGS	DESCRIPTION	254	146	174	255	TEXTURES\s.jpg
LHGR	DESCRIPTION	254	174	50	255	TEXTURES\vs.jpg
Lynch Gravel Formation	DESCRIPTION	254	174	50	255	TEXTURES\vs.jpg
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London Clay	DESCRIPTION	179	156	125	255	TEXTURES\LC.jpg
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BLPUM	DESCRIPTION	178	90	196	255	TEXTURES\black.jpg
BR__D	DESCRIPTION	110	93	38	255	TEXTURES\black.jpg
BR__L	DESCRIPTION	207	180	93	255	TEXTURES\black.jpg
BR__M	DESCRIPTION	180	130	70	255	TEXTURES\black.jpg
BRGYD	DESCRIPTION	140	129	95	255	TEXTURES\black.jpg
BRGYL	DESCRIPTION	179	169	134	255	TEXTURES\black.jpg
BROLM	DESCRIPTION	168	162	47	255	TEXTURES\black.jpg
BRORM	DESCRIPTION	204	163	41	255	TEXTURES\black.jpg
BRREM	DESCRIPTION	166	84	43	255	TEXTURES\black.jpg
BRYED	DESCRIPTION	194	165	72	255	TEXTURES\black.jpg
BRYEL	DESCRIPTION	212	186	100	255	TEXTURES\black.jpg
BRYEM	DESCRIPTION	214	178	60	255	TEXTURES\black.jpg
GR__D	DESCRIPTION	47	110	50	255	TEXTURES\black.jpg

GR__M	DESCRIPTION	101	163	103	255	TEXTURES\black.jpg
GR__L	DESCRIPTION	175	214	177	255	TEXTURES\black.jpg
GRBLM	DESCRIPTION	62	163	144	255	TEXTURES\black.jpg
GRGYM	DESCRIPTION	136	163	132	255	TEXTURES\black.jpg
GRYEM	DESCRIPTION	207	222	91	255	TEXTURES\black.jpg
GY__D	DESCRIPTION	107	107	107	255	TEXTURES\black.jpg
GY__L	DESCRIPTION	212	212	212	255	TEXTURES\black.jpg
GY__M	DESCRIPTION	179	179	179	255	TEXTURES\black.jpg
GYBL	DESCRIPTION	133	150	158	255	TEXTURES\black.jpg
GYBLD	DESCRIPTION	93	122	135	255	TEXTURES\black.jpg
GYBLL	DESCRIPTION	190	203	209	255	TEXTURES\black.jpg
GYBLM	DESCRIPTION	87	114	150	255	TEXTURES\black.jpg
GYBRD	DESCRIPTION	122	114	84	255	TEXTURES\black.jpg
GYBRL	DESCRIPTION	184	174	133	255	TEXTURES\black.jpg
GYBRM	DESCRIPTION	153	137	75	255	TEXTURES\black.jpg
GYGRD	DESCRIPTION	109	128	97	255	TEXTURES\black.jpg
GYGRL	DESCRIPTION	179	194	170	255	TEXTURES\black.jpg
GYGRM	DESCRIPTION	170	196	154	255	TEXTURES\black.jpg
GYOLD	DESCRIPTION	136	148	99	255	TEXTURES\black.jpg
GYOLL	DESCRIPTION	181	191	153	255	TEXTURES\black.jpg
GYOLM	DESCRIPTION	156	171	113	255	TEXTURES\black.jpg
GYORL	DESCRIPTION	217	200	165	255	TEXTURES\black.jpg
OL__L	DESCRIPTION	199	198	122	255	TEXTURES\black.jpg
OL__M	DESCRIPTION	179	178	104	255	TEXTURES\black.jpg
OR__M	DESCRIPTION	219	174	70	255	TEXTURES\black.jpg
ORBRM	DESCRIPTION	204	140	43	255	TEXTURES\black.jpg
ORYED	DESCRIPTION	247	209	86	255	TEXTURES\black.jpg
WH	DESCRIPTION	255	255	255	255	TEXTURES\black.jpg
YE__M	DESCRIPTION	235	228	87	255	TEXTURES\black.jpg
BLANK	DESCRIPTION	255	255	255	255	TEXTURES\black.jpg
COM	DESCRIPTION	189	128	183	255	TEXTURES\black.jpg
COMU	DESCRIPTION	247	205	243	255	TEXTURES\black.jpg
DENM	DESCRIPTION	84	152	186	255	TEXTURES\black.jpg
DEN	DESCRIPTION	140	154	191	255	TEXTURES\black.jpg
DENDENV	DESCRIPTION	140	154	191	255	TEXTURES\black.jpg
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DENV	DESCRIPTION	83	83	156	255	TEXTURES\black.jpg
FRI	DESCRIPTION	228	228	255	255	TEXTURES\black.jpg
IND	DESCRIPTION	0	0	0	255	TEXTURES\black.jpg
LS	DESCRIPTION	114	185	194	255	TEXTURES\black.jpg
LSDENM	DESCRIPTION	114	185	194	255	TEXTURES\black.jpg
LSV	DESCRIPTION	168	229	237	255	TEXTURES\black.jpg
LSVLS	DESCRIPTION	168	229	237	255	TEXTURES\black.jpg
SFT	DESCRIPTION	207	177	143	255	TEXTURES\black.jpg
SFTFRM	DESCRIPTION	207	177	143	255	TEXTURES\black.jpg
SFTV	DESCRIPTION	212	200	186	255	TEXTURES\black.jpg
SFTVSFT	DESCRIPTION	212	200	186	255	TEXTURES\black.jpg

FRM	DESCRIPTION	201	150	92	255	TEXTURES\black.jpg
FRMSTI	DESCRIPTION	201	150	92	255	TEXTURES\black.jpg
STI	DESCRIPTION	171	133	89	255	TEXTURES\black.jpg
STISTIV	DESCRIPTION	171	133	89	255	TEXTURES\black.jpg
STIV	DESCRIPTION	156	123	84	255	TEXTURES\black.jpg
STIVHD	DESCRIPTION	156	123	84	255	TEXTURES\black.jpg
HD	DESCRIPTION	135	105	70	255	TEXTURES\black.jpg
STR	DESCRIPTION	64	64	96	255	TEXTURES\black.jpg
VI	DESCRIPTION	213	247	205	255	TEXTURES\chalk.jpg
VITOV	DESCRIPTION	155	230	138	255	TEXTURES\chalk.jpg
VTO	DESCRIPTION	130	230	110	255	TEXTURES\chalk.jpg
VTOIV	DESCRIPTION	118	235	91	255	TEXTURES\chalk.jpg
IV	DESCRIPTION	80	200	71	255	TEXTURES\chalk.jpg
IVTOIII	DESCRIPTION	67	179	41	255	TEXTURES\chalk.jpg
III	DESCRIPTION	67	170	20	255	TEXTURES\chalk.jpg
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II	DESCRIPTION	24	120	2	255	TEXTURES\chalk.jpg
IITOI	DESCRIPTION	24	90	2	255	TEXTURES\chalk.jpg
I	DESCRIPTION	13	71	0	255	TEXTURES\chalk.jpg
STRE	DESCRIPTION	255	0	0	255	TEXTURES\black.jpg
STRM	DESCRIPTION	214	120	69	255	TEXTURES\black.jpg
STRV	DESCRIPTION	230	100	30	255	TEXTURES\black.jpg
WK	DESCRIPTION	255	171	171	255	TEXTURES\black.jpg
WKV	DESCRIPTION	252	205	205	255	TEXTURES\black.jpg
WKM	DESCRIPTION	255	127	127	255	TEXTURES\black.jpg
UCOM	DESCRIPTION	96	64	64	255	TEXTURES\black.jpg
Dm	DESCRIPTION	224	252	216	255	TEXTURES\black.jpg
Dc	DESCRIPTION	197	252	184	255	TEXTURES\black.jpg
LD	DESCRIPTION	160	250	137	255	TEXTURES\black.jpg
MD	DESCRIPTION	71	191	40	255	TEXTURES\black.jpg
CHD	DESCRIPTION	27	125	2	255	TEXTURES\black.jpg
ENG1	ENGINEERING	255	0	0	255	TEXTURES\black.jpg
ENG2	ENGINEERING	240	195	153	255	TEXTURES\black.jpg
ENG3	ENGINEERING	247	205	77	255	TEXTURES\black.jpg
ENG4	ENGINEERING	15	169	207	255	TEXTURES\black.jpg
ENG5	ENGINEERING	177	242	245	255	TEXTURES\black.jpg
ENG6	ENGINEERING	234	250	155	255	TEXTURES\black.jpg
ENG7	ENGINEERING	26	119	240	255	TEXTURES\black.jpg
ENG8	ENGINEERING	252	130	0	255	TEXTURES\black.jpg
ENG9	ENGINEERING	163	118	77	255	TEXTURES\black.jpg
ENG10	ENGINEERING	219	160	105	255	TEXTURES\black.jpg
ENG11	ENGINEERING	227	190	0	255	TEXTURES\black.jpg
HAZA	ENGINEERING	0	255	0	255	TEXTURES\black.jpg
HAZB	ENGINEERING	129	227	50	255	TEXTURES\black.jpg
HAZC	ENGINEERING	227	197	27	255	TEXTURES\black.jpg
HAZD	ENGINEERING	227	85	9	255	TEXTURES\black.jpg
HAZE	ENGINEERING	255	0	0	255	TEXTURES\black.jpg

WGR-VOID	DESCRIPTION	192	192	192	255	TEXTURES\black.jpg
MGR-ARTDP	DESCRIPTION	191	187	187	255	TEXTURES\black.jpg
LSGR-ARTDP	DESCRIPTION	214	214	214	255	TEXTURES\black.jpg
WGR-VOID	DESCRIPTION	200	200	200	255	TEXTURES\black.jpg
WMGR-ARTDP	DESCRIPTION	200	200	200	255	TEXTURES\black.jpg
SOIL-SOIL	DESCRIPTION	99	66	51	255	TEXTURES\black.jpg
ALV1-ZCS	DESCRIPTION	248	231	40	255	TEXTURES\black.jpg
ALV2-SV	DESCRIPTION	108	108	42	255	TEXTURES\black.jpg
ALF-V	DESCRIPTION	255	176	148	255	TEXTURES\black.jpg
RTD1-SV	DESCRIPTION	255	201	148	255	TEXTURES\black.jpg
OXC-MDST	DESCRIPTION	117	148	0	255	TEXTURES\black.jpg
KLB-SDSM	DESCRIPTION	201	201	84	255	TEXTURES\black.jpg
KLS-SDSL	DESCRIPTION	201	201	84	255	TEXTURES\black.jpg
KLC-MDST	DESCRIPTION	84	84	0	255	TEXTURES\black.jpg
IOGO-LSMD	DESCRIPTION	255	224	0	255	TEXTURES\black.jpg
LIGO-LMAS	DESCRIPTION	237	117	0	255	TEXTURES\black.jpg
CB-LMST	DESCRIPTION	255	117	84	255	TEXTURES\black.jpg
FMB-MDST	DESCRIPTION	224	201	117	255	TEXTURES\black.jpg
FMB-LMST	DESCRIPTION	237	148	0	255	TEXTURES\black.jpg
SI-LMST	DESCRIPTION	237	255	176	255	TEXTURES\black.jpg
WHL-LMST	DESCRIPTION	224	255	117	255	TEXTURES\black.jpg
GOG-OOLM	DESCRIPTION	153	204	255	255	TEXTURES\black.jpg
GOG-LMST	DESCRIPTION	153	204	255	255	TEXTURES\black.jpg
AOL-LMST	DESCRIPTION	255	237	0	255	TEXTURES\black.jpg
AOL-OOLM	DESCRIPTION	255	237	0	255	TEXTURES\black.jpg
TRR-LMST	DESCRIPTION	255	237	0	255	TEXTURES\black.jpg
HMB-LMST	DESCRIPTION	224	255	0	255	TEXTURES\black.jpg
TY-OOLM	DESCRIPTION	255	224	0	255	TEXTURES\black.jpg
TT-SHMD	DESCRIPTION	176	201	84	255	TEXTURES\black.jpg
TT-LMST	DESCRIPTION	201	148	0	255	TEXTURES\black.jpg
EYF-LMST	DESCRIPTION	54	201	224	255	TEXTURES\black.jpg
FE-MDST	DESCRIPTION	160	117	100	255	TEXTURES\black.jpg
FE-LMST	DESCRIPTION	237	224	117	255	TEXTURES\black.jpg
FE-OOLM	DESCRIPTION	237	224	117	255	TEXTURES\black.jpg
INO-OOLM	DESCRIPTION	255	148	0	255	TEXTURES\black.jpg
LIIO-LMAS	DESCRIPTION	176	148	117	255	TEXTURES\black.jpg
SALS-OOLM	DESCRIPTION	255	148	54	255	TEXTURES\black.jpg
CG-OOLM	DESCRIPTION	255	201	0	255	TEXTURES\black.jpg
UTG-LMST	DESCRIPTION	237	0	0	255	TEXTURES\black.jpg
ROBA-LMST	DESCRIPTION	84	237	224	255	TEXTURES\black.jpg
NGRV-OOLM	DESCRIPTION	201	224	224	255	TEXTURES\black.jpg
ASLS-LMST	DESCRIPTION	117	224	176	255	TEXTURES\black.jpg
BLPL-OOLM	DESCRIPTION	255	255	84	255	TEXTURES\black.jpg
HFD-SAMD	DESCRIPTION	224	117	176	255	TEXTURES\black.jpg
SQAR-LMST	DESCRIPTION	255	237	148	255	TEXTURES\black.jpg
CLCL-OOLM	DESCRIPTION	255	255	84	255	TEXTURES\black.jpg
CRKY-LMST	DESCRIPTION	255	237	84	255	TEXTURES\black.jpg

LECK-LMST	DESCRIPTION	148	0	84	255	TEXTURES\black.jpg
BDS-SDST	DESCRIPTION	201	200	84	255	TEXTURES\black.jpg
WHM-MDST	DESCRIPTION	201	117	84	255	TEXTURES\black.jpg
MRB-LMFE	DESCRIPTION	255	84	84	255	TEXTURES\black.jpg
DYS-SIMD	DESCRIPTION	255	84	0	255	TEXTURES\black.jpg
CHAM-MDST	DESCRIPTION	237	117	201	255	TEXTURES\black.jpg
LI-MDST	DESCRIPTION	237	176	176	255	TEXTURES\black.jpg
BLCR-MDST	DESCRIPTION	237	176	176	255	TEXTURES\black.jpg
TSF-LMST	DESCRIPTION	201	148	0	255	TEXTURES\black.jpg
LFE-MDST	DESCRIPTION	255	255	117	255	TEXTURES\black.jpg
LMIO-LMST	DESCRIPTION	255	255	84	255	TEXTURES\black.jpg
WGR	DESCRIPTION	192	192	192	255	TEXTURES\black.jpg
MGR	DESCRIPTION	191	187	187	255	TEXTURES\black.jpg
LSGR	DESCRIPTION	214	214	214	255	TEXTURES\black.jpg
WGR	DESCRIPTION	200	200	200	255	TEXTURES\black.jpg
WMGR	DESCRIPTION	200	200	200	255	TEXTURES\black.jpg
SOIL	DESCRIPTION	99	66	51	255	TEXTURES\black.jpg
ALV1	DESCRIPTION	248	231	40	255	TEXTURES\black.jpg
ALV2	DESCRIPTION	108	108	42	255	TEXTURES\black.jpg
ALF	DESCRIPTION	255	176	148	255	TEXTURES\black.jpg
RTD1	DESCRIPTION	255	201	148	255	TEXTURES\black.jpg
RTD2	DESCRIPTION	255	221	148	255	TEXTURES\black.jpg
RTD3	DESCRIPTION	255	241	148	255	TEXTURES\black.jpg
RTD4	DESCRIPTION	255	181	148	255	TEXTURES\black.jpg
OXC	DESCRIPTION	117	148	0	255	TEXTURES\black.jpg
KLB	DESCRIPTION	201	201	84	255	TEXTURES\black.jpg
KLS	DESCRIPTION	201	201	84	255	TEXTURES\black.jpg
KLC	DESCRIPTION	84	84	0	255	TEXTURES\black.jpg
IOGO	DESCRIPTION	255	224	0	255	TEXTURES\black.jpg
LIGO	DESCRIPTION	237	117	0	255	TEXTURES\black.jpg
CB	DESCRIPTION	255	117	84	255	TEXTURES\black.jpg
FMBM	DESCRIPTION	224	201	117	255	TEXTURES\black.jpg
FMB	DESCRIPTION	237	148	0	255	TEXTURES\black.jpg
SI	DESCRIPTION	237	255	176	255	TEXTURES\black.jpg
WHL	DESCRIPTION	224	255	117	255	TEXTURES\black.jpg
GOG	DESCRIPTION	153	204	255	255	TEXTURES\black.jpg
AOL	DESCRIPTION	255	237	0	255	TEXTURES\black.jpg
AOL	DESCRIPTION	255	237	0	255	TEXTURES\black.jpg
TRR	DESCRIPTION	255	237	0	255	TEXTURES\black.jpg
HMB	DESCRIPTION	224	255	0	255	TEXTURES\black.jpg
TY	DESCRIPTION	255	224	0	255	TEXTURES\black.jpg
TT	DESCRIPTION	176	201	84	255	TEXTURES\black.jpg
TT	DESCRIPTION	201	148	0	255	TEXTURES\black.jpg
EYF	DESCRIPTION	54	201	224	255	TEXTURES\black.jpg
FE	DESCRIPTION	160	117	100	255	TEXTURES\black.jpg
INO	DESCRIPTION	255	148	0	255	TEXTURES\black.jpg
LIIO	DESCRIPTION	176	148	117	255	TEXTURES\black.jpg

SALS	DESCRIPTION	255	148	54	255	TEXTURES\black.jpg
CG	DESCRIPTION	255	201	0	255	TEXTURES\black.jpg
UTG	DESCRIPTION	237	0	0	255	TEXTURES\black.jpg
ROBA	DESCRIPTION	84	237	224	255	TEXTURES\black.jpg
NGRV	DESCRIPTION	201	224	224	255	TEXTURES\black.jpg
ASLS	DESCRIPTION	117	224	176	255	TEXTURES\black.jpg
BLPL	DESCRIPTION	255	255	84	255	TEXTURES\black.jpg
HFD	DESCRIPTION	224	117	176	255	TEXTURES\black.jpg
SQAR	DESCRIPTION	255	237	148	255	TEXTURES\black.jpg
CLCL	DESCRIPTION	255	255	84	255	TEXTURES\black.jpg
CRKY	DESCRIPTION	255	237	84	255	TEXTURES\black.jpg
LECK	DESCRIPTION	148	0	84	255	TEXTURES\black.jpg
BDS	DESCRIPTION	201	200	84	255	TEXTURES\black.jpg
WHM	DESCRIPTION	201	117	84	255	TEXTURES\black.jpg
MRB	DESCRIPTION	255	84	84	255	TEXTURES\black.jpg
DYS	DESCRIPTION	255	84	0	255	TEXTURES\black.jpg
CHAM	DESCRIPTION	237	117	201	255	TEXTURES\black.jpg
LI	DESCRIPTION	237	176	176	255	TEXTURES\black.jpg
BLCR	DESCRIPTION	237	176	176	255	TEXTURES\black.jpg
TSF	DESCRIPTION	201	148	0	255	TEXTURES\black.jpg
LFE	DESCRIPTION	255	255	117	255	TEXTURES\black.jpg
LMIO	DESCRIPTION	255	255	84	255	TEXTURES\black.jpg
FAULT	DESCRIPTION	255	0	176	255	TEXTURES\black.jpg
SLIP	DESCRIPTION	0	0	0	100	TEXTURES\black.jpg
TOP	DESCRIPTION	0	0	0	0	TEXTURES\black.jpg
NO-XSV	DESCRIPTION	255	201	148	255	TEXTURES\black.jpg
ALV-XCZSV	DESCRIPTION	255	255	176	255	TEXTURES\black.jpg
NO1B-XSV	DESCRIPTION	255	201	148	255	TEXTURES\black.jpg
HEAD-XCZSV	DESCRIPTION	224	176	176	255	TEXTURES\black.jpg
NO1A-XSV	DESCRIPTION	255	201	148	255	TEXTURES\black.jpg
SURA-XSV	DESCRIPTION	255	176	117	255	TEXTURES\black.jpg
WV-XSV	DESCRIPTION	237	148	84	255	TEXTURES\black.jpg
SGAO-XVSZC	DESCRIPTION	255	201	255	255	TEXTURES\black.jpg
HAN-XSV	DESCRIPTION	237	117	54	255	TEXTURES\black.jpg
RTD1-V	DESCRIPTION	255	201	148	255	TEXTURES\black.jpg
STFD-LMST	DESCRIPTION	255	224	84	255	TEXTURES\black.jpg
HYBK-SDSM	DESCRIPTION	255	237	176	255	TEXTURES\black.jpg
AMC-MDST	DESCRIPTION	201	237	54	255	TEXTURES\black.jpg
AOL-LMOOL	DESCRIPTION	255	237	0	255	TEXTURES\black.jpg
GOG-LMOOL	DESCRIPTION	255	224	0	255	TEXTURES\black.jpg
TY-LMOOL	DESCRIPTION	255	224	0	255	TEXTURES\black.jpg
OXC-SLST	DESCRIPTION	176	224	84	255	TEXTURES\black.jpg
HWLS-LMST	DESCRIPTION	117	255	237	255	TEXTURES\black.jpg
250K_BEDROCK	fault trace at surface	0	51	255	255	TEXTURES\black.jpg
ALV	Alluvium	204	204	0	255	TEXTURES\black.jpg

References

British Geological Survey holds most of the references listed below, and copies may be obtained via the library service subject to copyright legislation (contact libuser@bgs.ac.uk for details). The library catalogue is available at: http://geolib.bgs.ac.uk.

GREEN G.W 1992. *Bristol and Gloucester region*. (BGS.) *Memoir of the British Geological Survey sheet 16 (British regional Gology)* ISBN 0 11 88482 2

SUMBLER M.G, BARRON A.J.M AND MORIGI A.N 2000. Geology of the Cirencester District (BGS). *Memoir of the British Geological Survey Sheet 235 (England and Wales)* ISBN 0 11 884555 1

INSTITUTE OF GEOLOGICAL SCIENCES 1974 Type of Map Area: 1:50 000 Sheet 252 Swindon

BRITISH GEOLOGICAL SURVEY 1985 Type of map Area: 1:50 000 sheet 235 Cirencester

MEHAFFY A 2010 CIRENCESTER AND CRICKLADE 3D GEOLOGICAL MODEL: APPLICATIONS AS A EDUCATIONAL TOOL FOR UNDERGRADUATE STUDENTS (IN PREP)