



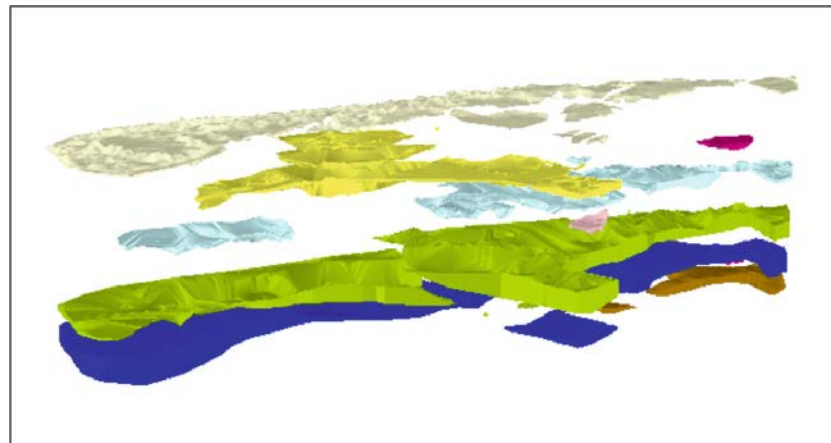
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# Model metadata report for the GSI3D model of the superficial geology of the ground seaward of the Drigg Low Level Waste Repository Site, West Cumbria

Geology and Landscape Programme

Internal Report IR/12/075





BRITISH GEOLOGICAL SURVEY

GEOLOGY AND LANDSCAPE PROGRAMME

INTERNAL REPORT IR/12/075

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The superficial geological model viewed from the east.

*Bibliographical reference*

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# Model metadata report for the GSI3D model of the superficial geology of the ground seaward of the Drigg Low Level Waste Repository Site, West Cumbria

E Callaghan and C A Auton

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## Summary

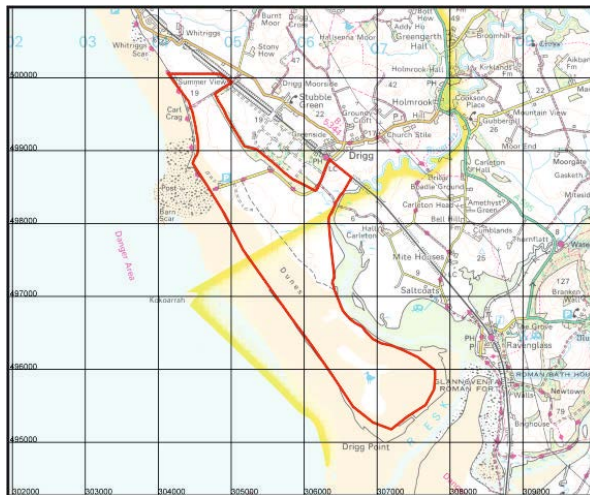
This report describes the GSI3D model of the superficial geology of the ground seaward of the Drigg Low Level Waste Repository site, West Cumbria. This geological model is based on the GSI3D geophysical model described in IR/12/071:

Callaghan, E, Kearsey, T, Finlayson, A and Auton, C.A. 2012. Model metadata report for the GSI3D model of shallow geophysical surveys of the ground seaward of the Drigg Low Level Waste Repository Site, West Cumbria. *British Geological Survey Internal Report*, IR/12/071. 16pp.

The geophysical model was built to show resistivity characteristics of Quaternary sequences overlying sandstone bedrock and was commissioned by the National Nuclear Laboratory (NNL) for Low Level Waste Repository Ltd (LLWR) and is Commercial in Confidence.

The superficial geological model is not Commercial in Confidence.

# 1 Modelled volume, purpose and scale



**Figure 1: Location map showing area of study**

The modelled area outlined in red is known as the Drigg Spit in West Cumbria.

The geological GSI3D model has had attributes of superficial geology as well as bedrock added to the original generalized vertical section (GVS) of the geophysical model, see Figure 2.

The model has been constructed for use at 1:10,000 scale but can be used for more detailed studies.

## 2 Modelled surfaces

| name    | id   | code    | old_drigg | 2007_present | BGS_lithostrat | full_lithostrat_name  | geological description             |
|---------|------|---------|-----------|--------------|----------------|---|------------------------------------|
| DTM     | 0    | DTM     | NULL      | NULL         | NULL           | NULL  | NULL                               |
| SITE    | 2    | SITE    | NULL      | NULL         | NULL           | NULL  | LLWR Site                          |
| A       | 5    | A       | HFF       | A            | DPS            | Drigg_Point_Sand_Formation                                  | Post_glacial_sands                 |
| B1      | 25   | B1      | LFF       | B2           | PMS            | Peckmill_Sand_Member  | Recent_estuarine_drainage_sequence |
| B2      | 30   | B2      | LFF       | B2           | PMS            | Peckmill_Sand_Member  | Recent_estuarine_drainage_sequence |
| B3      | 35   | B3      | LFF       | B2           | PMS            | Peckmill_Sand_Member  | Recent_estuarine_drainage_sequence |
| C       | 40   | C       | LFF       | B2           | PPG            | Peel_Place_Sand_and_Gravel_Member                           | Incised_sand_and_gravel            |
| D1      | 45   | D1      | PCF       | B2           | FWT            | Fishgarth_Wood_Till_Member                                  | Upper_Till_sequence                |
| D2      | 50   | D2      | PCF       | B2           | DBT            | Drigg_Beach_Till_Member                                     | Upper_Till_sequence                |
| D3      | 52   | D2      | PCF       | B2           | DBT            | Drigg_Beach_Till_Member                                     | Upper_Till_sequence                |
| E1      | 55   | E1      | FOF       | B2           | KWS_RVT        | Kirkland_Wood_Sand_and_Gravel_Member_Ravenglass_Till_Member | Fluvial_outwash_sequence           |
| E2      | 60   | E2      | MDF       | B3           | BSS            | Barn_Scar_Sand_and_Silt_Member                              | Fluvial_outwash_sequence           |
| E3      | 62   | E3      | NULL      | NULL         | BSS            | Barn_Scar_Sand_and_Silt_Member                              | Fluvial_outwash_sequence           |
| F       | 65   | F       | MDF       | C            | HRT_MST        | Holmrook_Till_Member_Maudsyke_Till_member                   | Lower_Till_sequence                |
| PQU     | 70   | PQU     | NULL      | NULL         | SBS            | St_Bees_Sandstone_Formation                                 | Pre_quaternary_rock                |
| C_top   | -100 | C_top   | NULL      | NULL         | PPG_lens       | Peel_Place_Sand_and_Gravel_Member_lens                      | C_lens                             |
| C_base  | 100  | C_base  | NULL      | NULL         | PPG_lens       | Peel_Place_Sand_and_Gravel_Member_lens                      | C_lens                             |
| E2_top  | -150 | E2_top  | NULL      | NULL         | BSS_lens       | Barn_Scar_Sand_and_Silt_Member_lens                         | E2_lens                            |
| E2_base | 150  | E2_base | NULL      | NULL         | BSS_lens       | Barn_Scar_Sand_and_Silt_Member_lens                         | E2_lens                            |

**Figure 2: GVS showing BGS lithostratigraphical coding (see column 6) and full lithostratigraphical name (see column 7)**

## 3 Modelled faults

Not applicable

## 4 Model datasets

The model datasets are those described in Callaghan et al. (2012) which have been reattributed

according to the standard BGS Quaternary Lithostratigraphic Scheme of McMillan et al. (2011). The latter follows the Quaternary stratigraphy of the Sellafeld area established by Merritt and Auton (2000).

The reattribution is as shown in Figure 2 which amends Table 1 of Callaghan et al. (2012) by assigning BGS lexicon codes to the geophysical units described in the original model.

General caveats regarding BGS datasets and interpretations follow those in Callaghan et al. (2012)

Data for the geophysical model can be found at this link:

[W:\Teams\CEC\LLWRCoastalErosion\RestrictedProjectInformation\Drigg\\_3d\\_model](W:\Teams\CEC\LLWRCoastalErosion\RestrictedProjectInformation\Drigg_3d_model)

**Data for the lithostratigraphical model described here can be found at this link:**

[W:\Teams\CEC\LLWRCoastalErosion\RestrictedProjectInformation\Drigg\\_3d\\_model\MODEL\\_FILES\Lithostrat\\_Model](W:\Teams\CEC\LLWRCoastalErosion\RestrictedProjectInformation\Drigg_3d_model\MODEL_FILES\Lithostrat_Model)

## 5 Dataset integration and Model development log

See Callaghan et al. (2012)

## 6 Model workflow

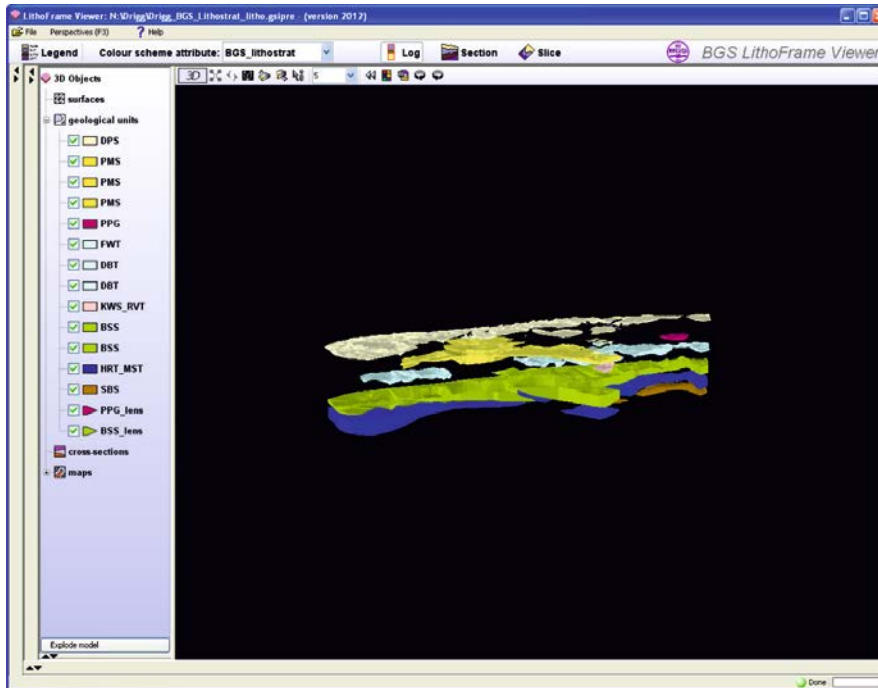
See Callaghan et al. (2012)

## 7 Model assumptions, geological rules and model uncertainty etc.

See Callaghan et al. (2012)

## 8 Model image

Figure 3 shows a screen grab of the GSI3D model reattributed with the formal Quaternary lithostratigraphy. The table of contents (left hand side of image) shows BGS lexicon codes. Most of the envelopes show individual lithostratigraphical units (e.g. DPS = Drigg Point Sand Formation; PMS = Peckmill Sand Member). The pairing of codes is denoted by the code abbreviation with an underscore between them (e.g. KWS\_RVT) this indicates that the envelope comprises of two separate BGS lithostratigraphical units, see Figure 2. The full Quaternary lithostratigraphy of the sequence within the modelled area is described in detail in Merritt and Auton (2000).



**Figure 3: Snapshot from the 3D model showing coded lithostratigraphy (vertical exaggeration x3)**

## 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>.

Callaghan, E, Kearsey, T, Finlayson, A and Auton, C.A. 2012. Model metadata report for the GSI3D model of shallow geophysical surveys of the ground seaward of the Drigg Low Level Waste Repository Site, West Cumbria. *British Geological Survey Internal Report*, IR/12/071. 16pp.

McMillan, A.A, Hamblin, R.J.O, Merritt, J.W. 2011. A lithostratigraphical framework for onshore Quaternary and Neogene (Tertiary) superficial deposits of Great Britain and the Isle of Man. *British Geological Survey Research Report*, RR/10/03. 343pp

Merritt, J. W. and Auton, C. A. 2000. An outline of the lithostratigraphy and depositional history of Quaternary deposits in the Sellafield district, West Cumbria, *Proceedings of the Yorkshire Geological Society*, Vol. 53, Part 2, pp 129-154