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# Model metadata report for Swansea-Neath-Port-Talbot

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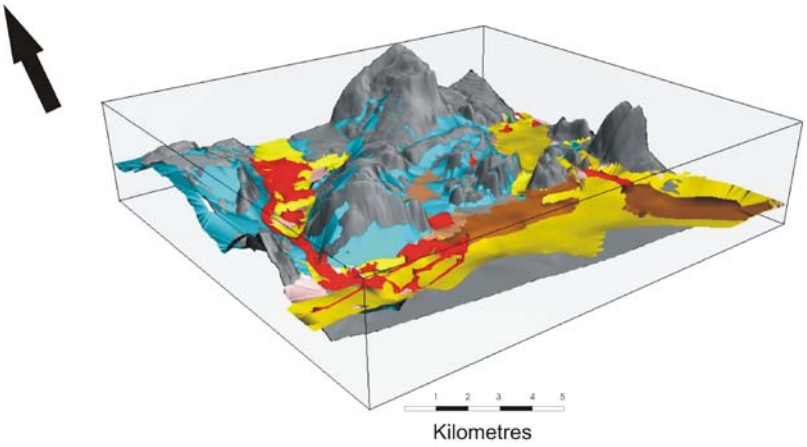
Open Report OR/14/45



BRITISH GEOLOGICAL SURVEY

GEOLOGY & REGIONAL GEOPHYSICS, ENGINEERING GEOLOGY PROGRAMMES

OPEN REPORT OR/14/45

# Model metadata report for Swansea-Neath-Port-Talbot

Price, S J and Waters, C N



*Keywords*

Swansea, Neath, Port-Talbot, 3D geology, urban geology.

*Map*

Sheet 247, 1:50 000 scale, Swansea

*Front cover*

Natural and artificial deposits in the 3D geological model displayed over a geological rockhead model (in grey).

*Bibliographical reference*

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Keyworth, Nottingham British Geological Survey 2014

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# Foreword

This report is the published product of a study by the British Geological Survey (BGS). It describes the metadata associated with a 3D geological model of Swansea-Neath-Port-Talbot. The model was built in 2002-2003 using GSI3D V1.5.

# Acknowledgements

The authors wish to thank Mr David Boon and Miss Ashley Patton for their helpful review comments and guidance.

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# Summary

This report describes the creation of city-wide 3D geological model of the natural and artificial superficial deposits of the Swansea-Neath-Port-Talbot area. It includes the glacigenic, coastal, estuarine, aeolian and organic deposits of Swansea Bay and the Tawe and Neath Valleys. The 3D geological model does not include bedrock units or geological faults. The construction of the model formed part of a wider study that investigated risks associated with land contamination from past industrial activity including metal processing.

The 3D geological model includes ten geological units and thirty one primary cross-sections. Cross-sections were constructed in a northeast-southwest orientation, parallel to the trend of the Tawe and Neath Valleys and northwest-southeast, perpendicular to them to a maximum depth of approximately 60 m below OD. Cross-sections were constructed by considering 752 borehole records that had been manually processed, interpreted and recorded in the British Geological Survey's Single Onshore Borehole Index and Borehole Geology databases.

The distribution of buried units in the Lower Tawe Valley and Neath Valley is defined by geological correlations that determine the geometry of the buried rock basins. Glaciolacustrine deposits and basal till are confined entirely within the buried valleys. Glaciolacustrine deposits are interpreted to be present in the lower part of the Neath Valley although they are only proved west of Briton Ferry (borehole SS79SW65). The presence of these deposits within the remainder of the Neath Valley in the study area is uncertain.

Glaciofluvial sand and gravel is present beneath alluvium in the Lower Tawe Valley and is interpreted to underlie tidal flat deposits in the Neath Valley. The presence of glaciofluvial deposits in the shallow offshore area is uncertain and an arbitrary southern limit was taken. Similarly, the presence of till in the offshore area is uncertain and may extend further offshore.

# 1 Modelled volume, purpose and scale

This metadata report describes a 3D geological model of the natural and artificial superficial deposits of the Swansea-Neath-Port-Talbot area. It includes the glacigenic, coastal, estuarine, aeolian and organic deposits of Swansea Bay and the Tawe and Neath Valleys. The 3D geological model does not include bedrock units or geological faults.

The 3D geological model is suitable for use at scales between 1:25 000 and 1:50 000 and is intended to provide a regional, city-wide interpretation of the distribution of geometry of natural and artificial deposits in the region. The geological model was constructed between 2002 and 2003 to define the 3D distribution and geometry of Quaternary deposits to a maximum depth of approximately 60 m below OD.

The construction of the model formed part of a wider study that investigated risks associated with land contamination from past industrial activity including metal processing. It was intended that the 3D geological model of superficial deposits could be used as part of a regional risk assessment of contaminated land and be used to assess groundwater recharge and flow. The results of the study including a description of the 3D geological model and the geological modelling methodology is provided in (Waters et al., 2005; Waters et al., 2006).

Figure 1 illustrates the geographic extent of the 3D geological model. The extent of the geological model of superficial deposits corresponds to quarter sheets SS69NE, SS69SE, SS79NW and SS79SW.

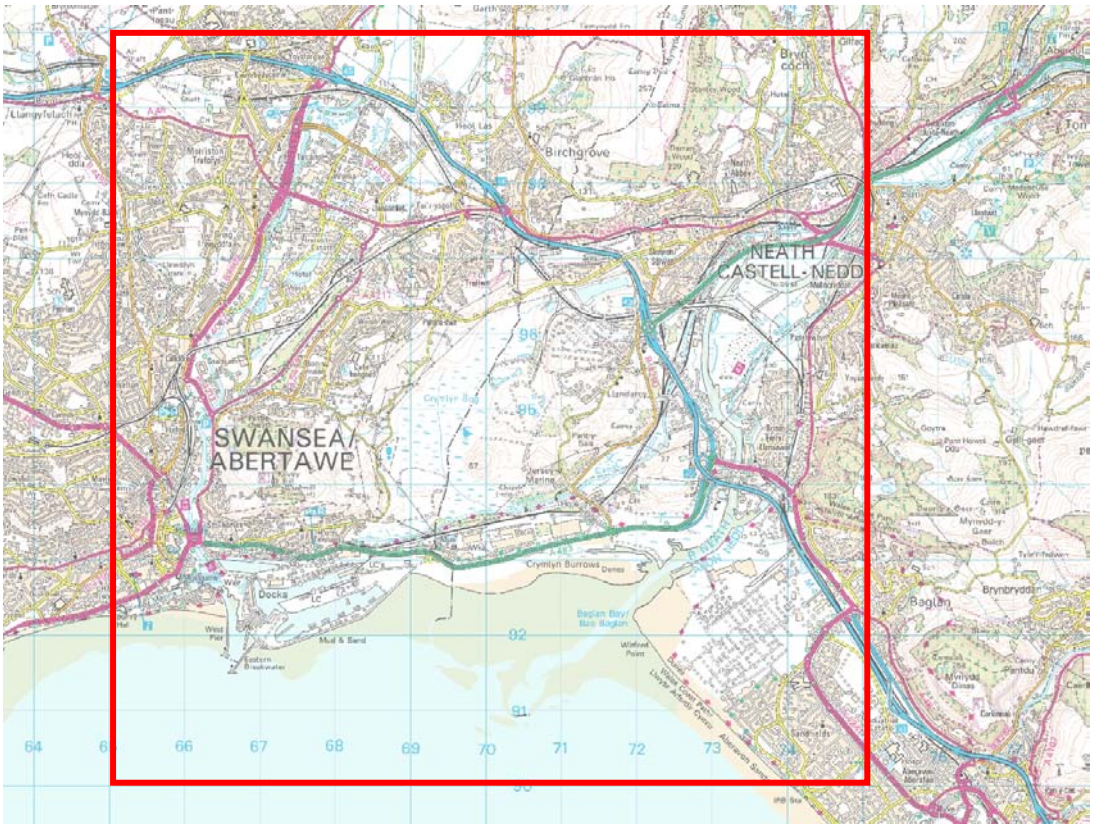


**Figure 1 Geographic extent of the 3D geological model of the superficial deposits of Swansea-Neath-Port-Talbot.**

# 2 Modelled surfaces/volumes

The units included in the 3D geological model are shown in Table 1.

| Model unit code | Lex | RCS | Comment |
|---|---|---|---|
| mgr | MGR | N/A | Made Ground. Undifferentiated. Lithology not defined. Only significant areas of Made Ground proved in boreholes included. |
| bsa | BSA | S | Blown Sand. |
| alv | ALV | ZCS | Alluvium of the Tawe and Neath rivers. Undifferentiated. |
| peat_1 | PEAT | P | Peat at Crymlyn Bog and surrounding area. |
| btfd | BTFU | SCZ | Beach and Tidal Flat Deposits combined. |
| peat_2 | PEAT | P | Peat at subcrop in Baglan area. |
| gfdu | GFDU | SV | Glaciofluvial Deposits. Includes areas of combined Glaciofluvial Sheet Deposits and Glaciofluvial Ice Contact Deposits. |
| glld | GLLD | CZS | Glaciolacustrine Deposits in the Swansea and Neath Valleys. |
| till | TILL | CSVL | Till. Undifferentiated. |
| bedrock | N/A | ROCK | Bedrock at geological rockhead beneath natural and artificial superficial deposits. Base bedrock represents base of model only. |

**Table 1 Geological units included in the Swansea-Neath-Port-Talbot 3D geological model.**

The geology of the Swansea-Neath-Port-Talbot area is described in (Waters et al., 2005; Waters et al., 2006).

# 3 Modelled faults

Geological faults are not included in the 3D superficial deposits model.

# 4 Model datasets

A description of the datasets used in the 3D superficial deposits model is shown in Table 2.

# 5 Dataset integration

Borehole records were combined with 1:50 000 digital geological map data to create the 3D geological model.

| Dataset | Comment |
|---|---|
| DTM | Derived from Ordnance Survey Landform Profile 5 m contours and spot heights using a cell size of 20 m. TIN created from file [swan_dtmgrid10k.asc] |
| Rockhead model | A project specific geological rockhead model was used derived from manual construction and digitisation of rockhead contours drawn using topographical contours, spot heights and borehole records proving the base of superficial deposits. Rockhead model converted to TIN from file [first_rockhead_final]. |
| Borehole data | All boreholes selected from BGS's Single Onshore Borehole Index (SOBI) and Borehole Geology (BOGE) corresponding to quarter sheets SS69NE, SS69SE, SS79NW and SS79SW and geological interpreter code DIS.<br><br>Boreholes with missing start heights added manually by interpretation of Ordnance Survey Landform Profile 5 m contours and spot heights (Appendix 1).<br><br>Boreholes with missing lithostratigraphical interpretation corrected or amended in two ways. 1. Corrected or amended in borehole geology file (BLG) prior to modelling based on re-interpretation of borehole log and/or geological map. 2. Where re-interpretation was not possible, code UNKN was entered and resolved during 3D geological modelling. For the latter, the geological interpretation has not been back-populated in Borehole Geology. Lithostratigraphical interpretation changes listed in spreadsheets accompanying the metadata for the 3D geological model [NULL_LITHOSTRATIGRAPHY and NULL_LITHOSTRATIGRAPHY2].<br><br>Lithological codes derived from the BOGE download were converted in to codes used for unlithified deposits following the procedures described in (Cooper et al., 2006).<br><br>Elevation difference between DTM and borehole start elevation generally less than 1 m. Geological correlation undertaken on the basis of borehole start heights.<br><br>2009 boreholes and trial pits were recorded in 2002 in BGS's Single Onshore Borehole Index (SOBI) database within quarter sheets SS69NE, SS69SE, SS79NW and SS79SW. A subset of 752 boreholes was selected for geological interpretation and digital coding to provide the basis for modelling the superficial deposits. 476 boreholes were considered for the creation of correlated cross-sections. The boreholes ranged in age from early 1900s to 2000 and were mainly derived from major road schemes and site investigations in the Swansea area. Consequently, many of the boreholes were arranged in linear transects across the area. Boreholes and trial pits are generally absent on the high ground north of Swansea and in the Crymlyn Bog area. |
| Map data | Digital geological map Swansea Sheet 247, DigMapGB50. 2002 version.<br><br>Ordnance Survey 1:50 000 scale topographical base map included. |
| Photographs | Field photographs illustrating the geomorphology of Quaternary deposits were considered. |

**Table 2 Summary of datasets used in the Swansea-Neath-Port-Talbot 3D geological model.**

# 6 Model development log

The model development log is shown in Appendix 2.

# 7 Model workflow

A GSI3D model workflow was followed. The geological model was constructed in 2002 before the introduction of formal GSI3D training courses and manuals. The workflow implemented the steps shown in Table 3. The 3D geological modelling workflow is described in more detail in Waters et al, 2005.

| Step | Description |
|---|---|
| 1 | Borehole coding in to BGS's Borehole Geology (BOGE) and Single Onshore Borehole Index (SOBI) tables. |
| 2 | Borehole selection using quarter sheets parameters SS69NE, SS69SE, SS79NW and SS79SW and geological interpreter code parameter DIS. Translation of lithological codes used in BOGE to be consistent with those specified by Cooper et al. (2006). Manual update of lithostratigraphical codes. Creation of GSI3D .bid and .blg files. 2009 boreholes available, 752 selected for consideration in the geological model. |
| 3 | Creation of DTM using Landform Profile 5 m contours and spot heights with 20 m cell size. |
| 4 | Use of digital geological rockhead model created for the Swansea-Neath-Port-Talbot area. Methodology described in (Waters et al., 2006). |
| 5 | GIS selection of DiGMAPGB50 (2002) digital geological map data for project area. |
| 6 | Selection of cross-section lines based on borehole distribution and depth of drilling. Deepest boreholes prioritised. Cross-sections orientated northwest-southeast (generally perpendicular to the Swansea and Neath Valleys) and northeast-southwest (generally parallel to the long profile of the Swansea and Neath Valleys). |
| 7 | Creation of envelopes using DiGMapGB50 digital geological polygons. |
| 8 | Model calculation. |
| 9 | Model iteration including synthetic section drawing to check model calculation. |
| 10 | Model calculation. |
| 11 | GIS calculation of reduced DTMs to calculate geological models at specified intervals below ground level of 1, 5, 10, 15 and 20 m. |
| 12 | GIS calculation of DTM for Swansea Morfa area for visualisation and presentation. |

**Table 3 GSI3D model workflow steps taken during creation of the Swansea-Neath-Port-Talbot 3D geological model.**

# 8 Model assumptions, geological rules used etc

| Number | Description of rule or assumption during modelling |
|---|---|
| 1 | Artificially modified ground includes made ground only. Made ground is not further sub-divided. Made ground is correlated on cross-sections where it is proved in boreholes. |
| 2 | There is a difference between the imported baseline geological rockhead surface and geological rockhead derived from the 3D geological model. This arises typically in steep-sided valleys where the GSI3D model has been used to interpret a different geometry of geological rockhead in-between boreholes considered in the geological model. |
| 3 | Four bounding cross-sections have been added to the model to calculate and represent geological rockhead. Bedrock is undifferentiated in the geological model and its base represents the base of the 3D geological model only. |

**Table 4 Assumptions about the Swansea-Neath-Port-Talbot 3D geological model.**

# 9 Model limitations

There has been no quantitative assessment of model uncertainty undertaken for the Swansea-Neath-Port-Talbot 3D geological model. A qualitative assessment of the limitations of the geological model is described in Table 5.

| Limitation | Description |
|---|---|
| 1 | The 3D geological model provides a city-wide assessment of the thickness, distribution and geometry of natural and artificial superficial deposits. It is not intended for site-specific use or as a replacement for ground investigation. |
| 2 | Borehole data distribution. Boreholes were selected for the creation of the 3D geological model on the basis of those that were previously selected for interpretation and coding. There are many more boreholes available in the region that could be interpreted and used to update the 3D geological model. |
| 3 | Of those digital borehole data selected, they are generally distributed along linear routes within and crossing the Swansea and Neath Valleys or in small clusters associated with local development including Swansea docks. Further borehole selection, processing and coding should be focused on increasing the density and distribution of data in-between those areas. The distribution of boreholes and the location of cross-sections considered in the creation of the 3D geological model of superficial deposits are shown in Figure 2. |
| 4 | Artificially modified ground is not subdivided. Classification and subdivision on the basis of lithology, age and geomorphology would improve the representation of made ground and other classes of artificially modified ground. Artificially modified ground in the area of Swansea docks is not accurately represented by the digital elevation model (DEM) used in the model. Bathymetric data or a modified DEM to account for water depth could be used to improve the accuracy of |

| | |
|---|---|
| | geological unit distribution and calculation of thicknesses of natural and artificial deposits. |
| 5 | Coastal and estuarine deposits are not subdivided and do not include lenses of peat which are commonly present. It may be possible to further subdivide this unit to differentiate variation in lithology. |
| 6 | The geological model was constructed using baseline digital geological data published in 2002. It could be updated to consider its integration with recent published digital geological map data. |
| 7 | The offshore extent of natural superficial deposits is unknown as marine borehole records were unavailable during model construction. |
| 8 | The distribution and extent of till beneath glaciolacustrine deposits within the axis of the Swansea valley is uncertain. |

**Table 5 Limitations within the Swansea-Neath-Port-Talbot 3D geological model.**

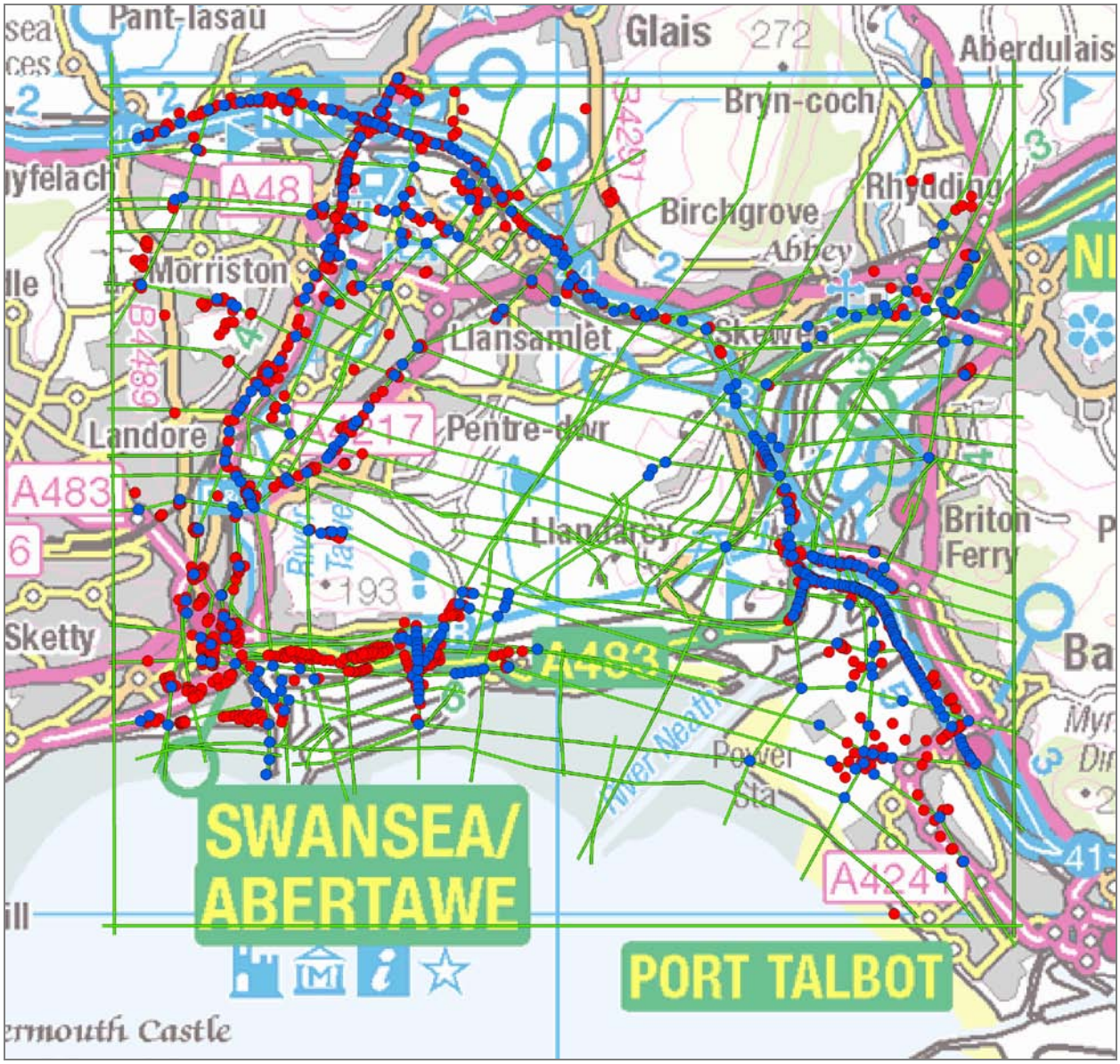


**Figure 2 Location of cross-sections and boreholes considered for the creation of the Swansea-Neath-Port-Talbot 3D geological model of superficial deposits. Red borehole locations –boreholes considered in the creation of the 3D geological model but not included on cross-sections, as of 2002. Blue borehole locations – boreholes selected and considered in the creation of cross-sections. Cross-section locations shown in green.**

# 10 Model images

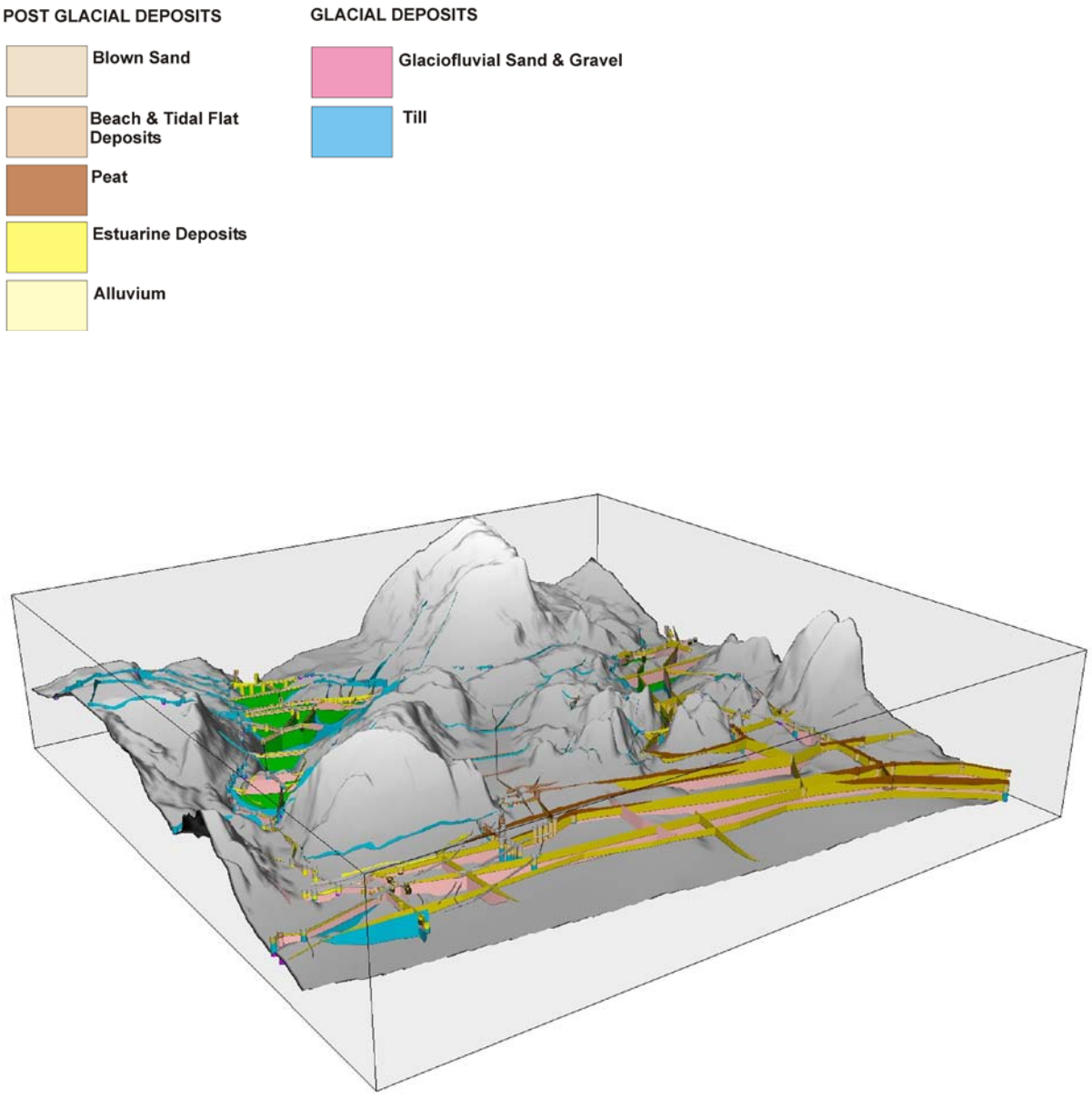


**Figure 3 Cross-sections showing natural superficial deposits in the Swansea-Neath-Port-Talbot 3D geological model overlying a model of geological rockhead (shown in grey). The geological rockhead model illustrates the geometry of the deeply scoured Tawe and Neath Valleys. View looking towards the northeast with large exaggeration. Green unit is Glaciolacustrine deposits.**

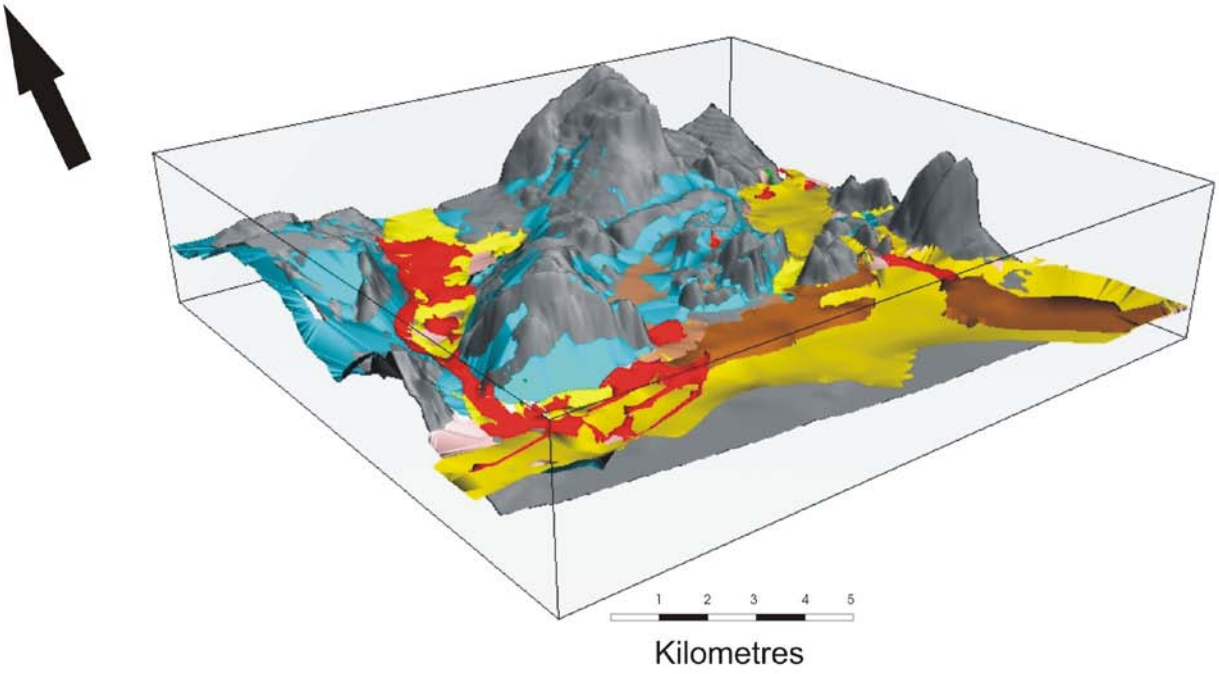


**Figure 4 3D geological model of natural and artificial deposits in the Swansea-Neath-Port-Talbot 3D geological model overlying a model of geological rockhead (shown in grey). Legend as shown in Figure 3 with the addition of made ground shown in red.**

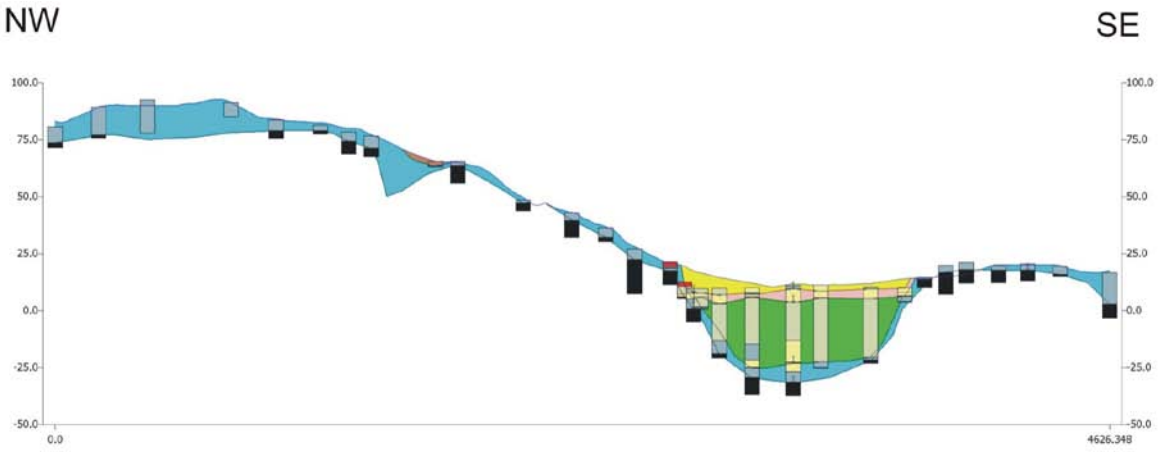


**Figure 5 Example of a 2D cross-section illustrating the stratigraphical relationships of natural superficial deposits in the Tawe Valley. Legend for correlated geological units as shown in Figure 3.**

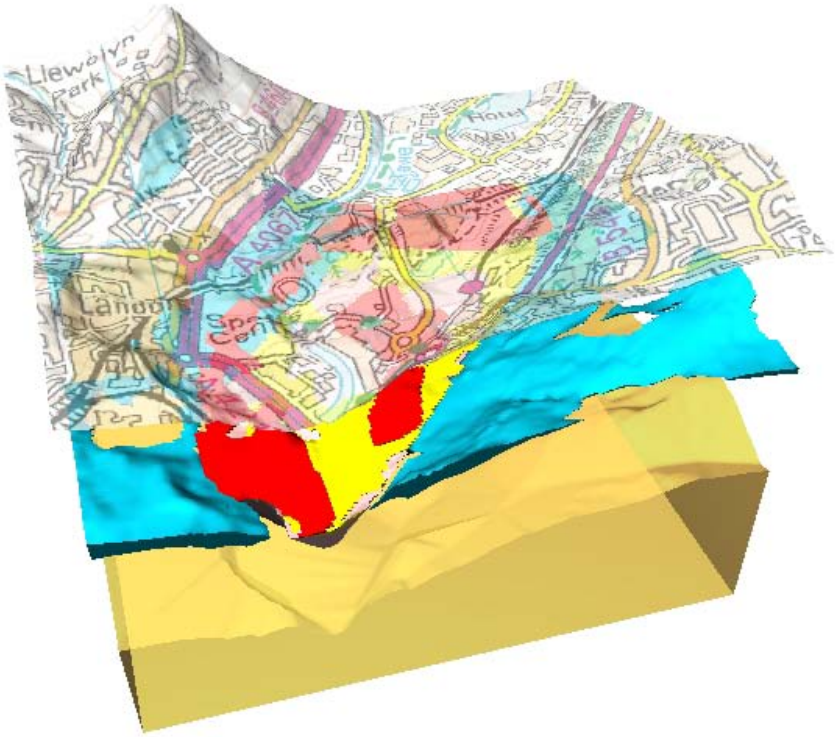


**Figure 6 Example of an extract from the Swansea-Neath-Port-Talbot 3D geological model in the area of Swansea Morfa. View looking north along the Tawe Valley. Legend as shown in Figure 3 with the addition of made ground shown in red.**

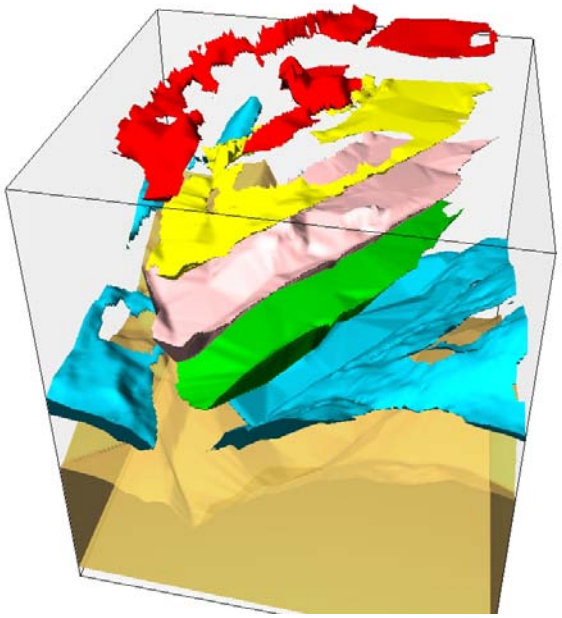

**Figure 7 Exploded view of the Swansea Morfa model as shown in Figure 6. Legend as shown in Figure 3 with the addition of made ground shown in red.**

# 11 Model uncertainty.

A quantitative or qualitative assessment of model uncertainty has not been made for the Swansea-Neath-Port-Talbot geological model of superficial deposits.

# 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.

COOPER, A H, KESSLER, H, and FORD, J R. 2006. A revised scheme for coding unlithified deposits (also applicable to engineering soils). *British Geological Survey*, Internal Report IR/05/123.

WATERS, C N, PRICE, S J, DAVIES, J, TYE, A M, BROWN, S E, and SCHOFIELD, D I. 2005. Urban geology of Swansea-Neath-Port-Talbot. 7-22 in *Urban Geology in Wales*. BASSETT, M G, DEISLER, V K, and NICHOL, D (editors). 2.

WATERS, C N, PRICE, S J, HAWKINS, M P, MARCHANT, A P, FIORINI, E, BROWN, S E, TYE, A M, FLEMING, C, DAVIES, J, SCHOFIELD, D I, BARCLAY, W J, and GARCIA-BAJO, M. 2006. A background to urban geoscience studies in the Swansea-Neath-Port-Talbot area. *British Geological Survey, Internal Report, IR/05/073R* (Keyworth, Nottingham).

# Appendix 1 Changes to borehole start heights

| BH_ID | BNG_EASTING | BNG_NORTHING | START_HEIGHT (M) | START_HEIGHT_SOURCE |
|---|---|---|---|---|
| SS69NE426. | 267430 | 0197280 | 8 | OS |
| SS69NE427. | 267260 | 0197340 | 8 | OS |
| SS69SE146. | 266584 | 0192291 | 3 | OS |
| SS69SE147. | 266598 | 0192081 | 3 | OS |
| SS69SE148. | 266591 | 0191873 | 3 | OS |
| SS69SE149. | 266553 | 0191695 | 3 | OS |
| SS69SE278. | 265980 | 0192840 | 0 | OS |
| SS79NW103. | 272990 | 0197020 | 20 | OS |
| SS79NW104. | 274890 | 0196850 | 6 | OS |
| SS79NW106. | 274430 | 0195460 | 8 | OS |
| SS79NW121. | 274870 | 0196430 | 10 | OS |
| SS79NW122. | 274860 | 0196440 | 9.4 | BL |
| SS79NW123. | 274850 | 0196450 | 10 | OS |
| SS79NW127. | 274920 | 0196520 | 12 | OS |
| SS79NW128. | 274910 | 0196500 | 10 | OS |
| SS79NW130. | 271000 | 0197200 | 55 | OS |
| SS79NW131. | 271100 | 0195240 | 52 | OS |
| SS79NW132. | 271300 | 0195400 | 52 | OS |
| SS79NW135. | 270030 | 0198030 | 38.3 | BL |
| SS79NW136. | 270020 | 0197990 | 41 | OS |
| SS79NW138. | 270080 | 0197940 | 44.7 | BL |
| SS79NW141. | 271143 | 0195318 | 52 | OS |
| SS79NW181. | 273780 | 0197670 | 20 | OS |
| SS79NW182. | 274750 | 0198400 | 25 | OS |
| SS79NW183. | 274830 | 0198450 | 18 | OS |
| SS79NW184. | 274940 | 0198560 | 28 | OS |
| SS79NW185. | 274940 | 0198440 | 18 | OS |
| SS79NW233. | 274400 | 0199900 | 70 | OS |
| SS79NW237. | 274230 | 0198740 | 53 | OS |
| SS79NW242. | 274430 | 0198760 | 46 | OS |
| SS79NW243. | 273940 | 0197170 | 5 | OS |
| SS79NW245. | 273570 | 0197130 | 8 | OS |
| SS79NW246. | 274840 | 0197590 | 8 | OS |
| SS79NW249. | 272530 | 0196310 | 15 | OS |
| SS79NW250. | 274120 | 0197220 | 5 | OS |
| SS79NW44. | 270150 | 0197510 | 65.7 | BL |
| SS79NW70. | 272650 | 0195580 | 10 | OS |
| SS79NW73. | 272690 | 0195060 | 5 | OS |
| SS79SW209. | 273500 | 0194230 | 10 | OS |
| SS79SW27. | 274120 | 0192570 | 5.8 | BL |
| SS79SW28. | 274150 | 0192110 | 7 | BL |
| SS79SW29. | 273620 | 0192370 | 8 | BL |
| SS79SW31. | 272920 | 0192720 | 3.5 | BL |
| SS79SW317. | 273510 | 0192740 | 7 | OS |
| SS79SW318. | 273550 | 0192880 | 7 | OS |

| | | | | |
|---|---|---|---|---|
| SS79SW319. | 273630 | 0192970 | 7 | OS |
| SS79SW320. | 273750 | 0192970 | 7 | OS |
| SS79SW321. | 273760 | 0192870 | 7 | OS |
| SS79SW322. | 273790 | 0193220 | 8 | OS |
| SS79SW323. | 273850 | 0193220 | 8 | OS |
| SS79SW324. | 273760 | 0193150 | 8 | OS |
| SS79SW334. | 273790 | 0194340 | 6 | OS |
| SS79SW335. | 273790 | 0194340 | 6 | OS |
| SS79SW336. | 273790 | 0194330 | 6 | OS |
| SS79SW337. | 273780 | 0194330 | 6 | OS |
| SS79SW338. | 273780 | 0194340 | 6 | OS |
| SS79SW339. | 273790 | 0194340 | 6 | OS |
| SS79SW340. | 273790 | 0194340 | 6 | OS |
| SS79SW35. | 272300 | 0191860 | 3.8 | BL |
| SS79SW353. | 274500 | 0191150 | 7 | OS |
| SS79SW354. | 274560 | 0191190 | 7 | OS |
| SS79SW355. | 274600 | 0191270 | 7 | OS |
| SS79SW356. | 274660 | 0191280 | 7 | OS |
| SS79SW36. | 272020 | 0194400 | 5 | OS |
| SS79SW385. | 273480 | 0193710 | 10 | OS |
| SS79SW39. | 273130 | 0192280 | 5 | OS |
| SS79SW40. | 274580 | 0190470 | 6 | OS |
| SS79SW442. | 274690 | 0192590 | 9 | OS |
| SS79SW443. | 274710 | 0192600 | 9 | OS |
| SS79SW48. | 273900 | 0194150 | 6.7 | BL |
| SS79SW63. | 274400 | 0192100 | 6 | OS |

**Table 6 Start height changes made to boreholes considered in the Swansea-Neath-Port-Talbot 3D geological model. OS (Ordnance Survey Landform Profile), BL (Borehole Log).**

# Appendix 2 GSI3D model development log

3D SUPERFICIAL DEPOSITS MODELLING

**DTM:**

ASCII VERSION OF SWAN_DTMGRID10K USING 20M CELL SIZE

**ROCKHEAD:**

ASCII VERSION OF FIRST_ROCKHEAD_FINAL.

DERIVED FROM DIGITIZED HAND DRAWN CONTOURS IN ADDITION TO BOREHOLE TD AND ROCKHEAD DATA CORRESPONDING TO INTERPRETER CODE DIS. CELL SIZE 30M.

**BID:**

SWAN_SOBI.BID

ALL BOREHOLES DERIVED FROM BGS_BOREHOLE_GEOLOGY AND SAVED IN ALL_BOREHOLES.MDB. QUERY BASED ON INTERPRETER CODE DIS AND QUATER SHEETS SS69SE, SS69NE

SS79NW AND SS79SW. MISSING START HEIGHTS UPDATED FROM START_HEIGHT_CHANGE.XLS.

**BLG:**

SWAN_BOGE.BLG

ALL BOREHOLES DERIVED FROM BGS_BOREHOLE_GEOLOGY AND SAVED IN ALL_BOREHOLES.MDB. QUERY BASED ON INTERPRETER CODE DIS AND QUATER SHEETS SS69SE, SS69NE

SS79NW AND SS79SW. MISSING LITHOSTRATIGRAPHY UPDATED FROM NULL_LITHOSTRATIGRAPHY.XLS (UPDATED BY COLIN WATERS). ERRORS IN

LITHOSTRATIGRAPHY INTERPRETATION CORRECTED IN ALL_BOREHOLES.MDB

**ASCII EXPORT:**

All modelled superficial deposits exported as an ascii grid. Refer to individual grids for cell size. Model calculated using a minimum node distance of 10 m.

**GSIPR:**

SWANSEA_CORL# First cross-section profiles drawn.

SWANSEA_SECTIONS_V1# Cross-sections updated. Cross-sections named with quarter sheet prefix. Preliminary envelopes drawn. Cross-sections re-ordered in quater sheet order.

SWANSEA_SECTIONS_V3# Helper sections added for individual units including thin til deposits on steep slopes.

SWANSEA_SECTIONS_FINAL Final cross-sections and envelopes.

SWANSEA_SECTIONS_FINAL_BEDROCK. Bedrock added to four boundary cross-sections along the perimeter of the 3D geological model area to visualise geological rockhead beneath

Quaternary deposits. Base of bedrock in model corresponds to base of model only. Correlation cross-sections extended to intersect bedrock boundary sections.

SWANSEA_SECTIONS_V5 Model review 5th August 2014. Swansea-Neath-Port-Talbot model re-build and metadata reporting

5th August 2014

S J Price

**GSI3D model re-build**

PURPOSE: To review the Swansea-Neath-Port-Talbot 3D geological model of superficial depoists. To create a supporting metadata file. To identify opportunities for model revision. This review has not included geological revision of the model. It has reviewed the current state of the model, created a gsipr model dataset and identified areas that need to be addressed for inclusion in the National Geological Framework.

SWANSEA_V2 GVS. GVS modified from original to include headers for GVS fields.

SWANSEA GLEG. GLEG taken from original GSI3D project folder.

SWANSEA BID. Taken from original GSI3D project folder. Metadata relating to borehole selection and processing described in metadata report.

SWANSEA BLG. Taken from original GSI3D project folder. Metadata relating to borehole selection and processing described in metadata report.

SWANSEA_FINAL_MODEL_4_8.gxml. Source of cross-sections and envelopes for rebuild. Note cross-sections were re-named in VERSION 2 (MODEL_V2) of the model to remove Quarter sheet prefixes. Bedrock undifferentiated added. Base of bedrock represents base of model.

SWANSEA_V5#.gsipr First re-build to create gsipr file using objects from SWANSEA_FINAL_MODEL_4_8.gxml.

swan_dtmgrid10k.asc Source raster file for DTM derived from original project Ordnance Survey Landform Profile dataset. Created TIN object in revised model.

first_rockhead_final.asc Geological rockhead model considered during 3D geological modelling. Metadata describing derivation in metadata report.