

1st Draft Spiddal GWB Description June .2004

Spiddal GWB: Summary of Initial Characterisation.

| Hydrometric Area Local Authority | Associated surface water features | Associated terrestrial ecosystem(s) | Area (km ²) |
|-------------------------------------|---|---|----------------------------|
| 31 Galway County Council | Rivers: An Sruthan Bui, Cashla, Crumlin Invermore, Knock, Lochinch, Owenboliska, Owenboliskey, Owengowla, Recess, Gowlabeg, Invermore, Knock, Knockadoagh, Owenriff, Polleen, Screeb. Lakes: See table 1 | Rosroe Bog (000324), Murvey Machair (002129), Galway Bay Complex (000268), Furbogh Wood (001267), Cregduff Lough (001251), Connemara Bog Complex (002034), Dogs Bay (001257) (O’Riain, 2004). | 774 |
| Topography | The land surface is characterised by steep slopes and mountainous terrain along the northern boundary and in the southwestern part of the GWB, flattening toward the coastline. Elevations range from 10-420 mAOD. The GWB is bounded on the south by the coastline and to the north by surface water divides and the Precambrian Marbles present on a line from Clifden – Recess – Maam Cross. | | |
| Geology and Aquifers | Aquifer categories | The main aquifer category in this GWB is: PI: Poor aquifer which is generally unproductive except for local zones. | |
| | Main aquifer lithologies | This GWB is composed primarily (92%) of Granites & other Igneous Intrusive rocks, namely the “Connemara Granite”, which extends from the coastline in the south as far north as a line linking Clifden and Maam Cross. Ordovician Volcanics, Precambrian Quartzites, Gneisses & Schists and Silurian Metasediments and Volcanics occur to a lesser extent and occupy the northern part of the GWB. Table 2 gives a full listing of the rock units. | |
| | Key structures | Granites are competent rocks that respond to strain by brittle fracturing. The degree of fracturing varies with depth and horizontally. There are almost 1000 mapped faults in the GWB, trending N-S, E-W, NW-SE and NE-SW. The fractures do not become in-filled because the granites have a low clay content. Tension joints, which are common in granites, are only found close to the surface. Regional joints become tight and impermeable at depth. Folding is seen in the northern part of the GWB where the non granitic rocks occur. The fold axes trend E-W; strata dip at right angles to the fold axes, generally at steep angles from 60-80°. | |
| | Key properties | The rocks are characterised by the absence of an intergranular permeability and the presence of low fissure permeability (Daly, 1985). Yield data are concentrated at the eastern end of the GWB, between Spiddal and Galway. There are three “good” wells in Spiddle which are located in a felsite dyke. A fourth well at Spiddle located in the main granite is a failed well. At Barna there is “poor” yielding well. One “good” well is located at Boleybeg. Transmissivity data available for the granites in the Leinster region is in the order of 20-30 m ² /d. In the vicinity of faults, transmissivity may be higher. Storativity is expected to be low (<0.5%). Resistivity surveys show areas of low resistivity in the vicinity of faults and this was interpreted as due to water in-filled fissures (Daly 1985). The data are inadequate to calculate groundwater gradients, however, are expected to be greater than 0.01. | |
| | Thickness | Most groundwater flux is likely to be in the uppermost part of the aquifer; comprising a broken and weathered zone typically less than 3 m thick; a zone of interconnected fissuring 10-15 m thick; and a zone of isolated poorly connected fissuring typically less than 150 m. | |
| Overlying Strata | Lithologies | Blanket Peat (“Connemara Bog”) covers 64% of the area, rock at the surface 23% and till 5.5%. A full list of subsoil types is given in Table 3. | |
| | Thickness | Subsoil thickness data are sparse. The available data indicate that the thickness are generally less than 3 m. The thickness of peat ranges from 0-6 m (Daly, 1985). Rock at surface is present in 25% of the area. | |
| | % area aquifer near surface | [Further Information to be added at a later date] | |
| | Vulnerability | [Further Information to be added at a later date] | |
| Recharge | Main recharge mechanisms | Diffuse recharge occurs via rainfall percolating through the subsoil and rock outcrops. Due to the low permeability of much of the subsoil (blanket peat) and the aquifers, a high proportion of the available recharge will discharge to the streams. In addition, the steep slopes in the mountainous areas promote surface runoff. Evidence for this is the stream density, which is greater than 1 km/km ² . | |
| | Est. recharge rates | [Further Information to be added at a later date] | |
| Discharge | Large springs and large known abstractions (m³/d) | Two ‘Good’ wells with reported yields of 118 m ³ /d and 164 m ³ /d. | |
| | Main discharge mechanisms | Shallow groundwater is likely to discharge to streams and lakes, but the limited bedrock transmissivity means that the baseflow component of the total streamflow will be low. Small springs and seeps are likely to issue at the stream heads and along their course. Seepages will develop on the coastal cliff faces. | |

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| Hydrochemical Signature | Very little hydrochemical data are available, but the minerals present in granite are generally acidic, meaning that corrosion and leaching of metals such as iron and manganese may present a problem. Radon and Uranium are associated granitic bodies, and present a risk to water quality. From selected data [n=7] for the granitic rocks across the country that are not overlain by sand/gravel or limestone till: Alkalinities range from 43-135 mg/l (CaCO ₃) with a median of 122 mg/l (CaCO ₃); Total Hardness ranges from 103-201 mg/l with a median 136 mg/l; and, conductivity ranges from 317-462 μ S/cm with a median of 440 μ S/cm. |
| Groundwater Flow Paths | Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. Flow paths are likely to be short – up to 100 m, with groundwater discharging rapidly to nearby streams and small springs. Overall, flow directions follow topography, generally to the south. The available water level data show that the water table is from 0-6 m below ground level. |
| Groundwater & Surface water interactions | Groundwater will discharge locally to streams and rivers crossing the aquifer and also to small springs and seeps. Owing to the poor productivity of the aquifers in this body it is unlikely that any major groundwater - surface water interactions occur. Baseflow to rivers and streams is likely to be relatively low. Lakes comprise approximately 5% of the GWB. |

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|----------------------------|---|
| Conceptual model | <ul style="list-style-type: none"> • The GWB is bounded to the west and south by the coast. The northern boundary is defined by the Precambrian Marbles, just south of Recess. The terrain is a mixture of low-lying and hilly areas. • The GWB is composed primarily of low transmissivity rocks. Most of the groundwater flux is in the uppermost part of the aquifer: comprising a broken and weathered zone typically less than 3m thick; a zone of interconnected fissuring typically less than 10m; and a zone of isolated fissuring typically less than 150m. • Recharge is limited by the peat and the low permeability bedrock. Recharge occurs diffusely through the subsoils and rock outcrops. • Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones. The water table is from 0-6 m below ground level and follows topography. Flow paths are likely to be short – up to 100 m, with groundwater discharging rapidly to nearby streams and small springs and flow directions are expected to follow topography. Overall flow direction is to the south. • The rock units in GWB are generally of low permeability and baseflow to rivers and streams is likely to be relatively low. |
| Attachments | Table 1, 2, 3 and Figure 1 |
| Instrumentation | Stream gauges: 31002, 31003, 31004, 31006, 31007, 31020, 31070, 31071, 31074, 31075. EPA Representative Monitoring points: None |
| Information Sources | Daly, D. (1985) <i>Groundwater in County Galway with particular reference to its Protection from Pollution</i> . Geological Survey of Ireland report for Galway County Council. 98pp. Pracht, M., Lees, A., Leake, B., Feely, M., Long, B., Morris, J., McConnell, B., (2003). <i>A geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 14, Galway Bay</i> . Unpublished Geological Survey of Ireland Map Series Report. Geological Survey of Ireland. Aquifer Chapters: The Granite Aquifer. Unpublished. O' Riain, G., (2004). <i>Water Dependent Ecosystems and Subtypes Draft Report</i> . WFD Support Projects. Compass Informatics in association with National Wildlife and Parks Service (DEHLG). |
| Disclaimer | Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae. |

Table 1. List of lakes within GWB

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|------------------------------|---------------------------|-----------------------------|-----------------------------|-----------------------|
| List of lakes | | | | |
| Aillebrack Lough | Loch na bhFaoilean | Lough Bola | Lough Nahillion | Loughyvangan |
| An Loch Dubh | Loch na bhFraochlai | Lough Bollard | Lough Nahoga | Manninmore Lough |
| An Loch Fadda | Loch na bhFreangcach | Lough Bonramush | Lough Nahouartia | Maumeen Lough |
| An Loch Fhada | Loch na Cloiche Baine | Lough Bunnahask | Lough Nakee | Maumeenmaunragh Lough |
| Athry Lough | Loch na Craoibhe | Lough Callanatrush | Lough Nalawney | Mering Lough |
| Barrowen Lough | Loch na Creibhinne | Lough Cam | Lough Naleehoogan | Mill Lough |
| Beagha Lough | Loch na dTamhnach | Lough Canagun | Lough Namanawaun | Muckanagh Lough |
| Beaghjivereen Lough | Loch na Faiche | Lough Carrafinla | Lough Namanoga | Needham's Lough |
| Big Island | Loch na gCaor | Lough Carrick | Lough Nambrackkeagh | Polladoory Loughs |
| Black Lough South | Loch na gCreagan | Lough Chaladh an Cnoic | Lough Nambracklauder | Rusroe Lough |
| Black Loughs | Loch na hAbhann Bige | Lough Chnocan | Lough Nambrackmore | Saineaghamore Lough |
| Black Pool | Loch na hAille | Lough Chriathraigh | Lough Nambroughania | Saints Lough |
| Boliska Lough | Loch na Liathroide | Lough Cloonadon | Lough Namoon | Seecon Lough |
| Bunnacliffa Lough | Loch na mBantracha | Lough Clurra | Lough Nanaghin | Shallow Lough |
| Cahereeshal Lough | Loch na mBreac Caoch | Lough Collantrave | Lough Nanaugh | Shanavara Lough |
| Clogheratinn Lough | Loch na Meacan | Lough Cong | Lough Naneeve/ Saints Lough | Shannawona Lough |
| Clogherkinnalougha | Loch na nArd-doiriu | Lough Corraundahy | Lough Nasauin | Struffnaconneelagh |
| Cloghernagun Lough | Loch na nEan | Lough Creggan | Lough Nasheooge | Tawnaghbaun Lough |
| Coolhanigra Lough | Loch na nOilean | Lough Crockaillenalee South | Lough Nasilloge | Toombeola Lough South |
| Creenaghmore Lough | Loch na Scinin | Lough Curreeil | Lough Naskeha | Truska Lough |
| Cregduff Lough | Loch na Tulai Bui | Lough Cuskeamatinny | Lough Natawnighter | Tullaghalaher Lough |
| Crockaillenalee | Loch Nuala | Lough Derracross North | Lough natawnymore | Tullagharone Lough |
| Deer Island | Loch Pheadai | Lough Derreen | Lough Natoran | Tully Lough |
| Doon Lough | Loch Ros an Mhil | Lough Derraneanearla | Lough Natully | Tullynaman Lough |
| Drum Lough West | Loch Sheanadh Dolachain | Lough Derrynaboha | Lough Navreaghoge | Uggool Lough |
| Eagles Lough | Loch Shliabh | Lough Dohola | Lough Naweelan | White Lough |
| Feaghroe Lough | Loch Tanai | Lough Down | Lough Oughter | Whitehillcock Lough |
| Glenaruidmore Lough | Loch Troscan | Lough Drama | Lough Oughteraglanna | Wood Lough |
| Glenicmurrin Lough | Loch Uachtair | Lough Duff | Lough Oughterpastia | Lough Nahavnygarriya |
| Glennaun Lough | Loch Uí Chadhan | Lough Ederaucruck | Lough Owran | Loughyvaneen |
| Glenturkan Lough | Lochain an Ghleanna Mhoir | Lough Emlagh | Lough Pibrum | |
| Holy Island | Lough Acaringe | Lough Enoer | Lough Poll | |
| Illeannaskeagh | Lough Achuss | Lough Fadda | Lough Rana | |
| Inverbeg Lough | Lough Aclogher | Lough Faddacrussan | Lough Rannaghaun | |
| Invermore Lough | Lough Aconeera | Lough Faddanagrav | Lough Sallagh | |
| Is_Inland | Lough Adav | Lough Fermoye | Lough Sallaghalogher | |
| Kane's Lough | Lough Adereen | Lough Fiddaunnavreaghlee | Lough Scalpdonnell | |
| Keeraunduff Lough | Lough Aderreen | Lough Glenn | Lough Scannive | |
| Knockafee Lough | Lough Adooraun | Lough Hagauwoo | Lough Seanadh Mhac Donail | |
| Knockalough | Lough Agaddy | Lough Inch | Lough Shannawinnia | |
| L. Chnos an Champa | Lough Agay | Lough Invernagleragh | Lough Sheedagh | |
| L.Beg | Lough Aghara | Lough Kankoge | Lough Shemus | |
| L.Thulaigh | Lough Agilky | Lough Keamnacally | Lough Skannive | |
| Lewtershask Lough | Lough Aglanna | Lough Keeraun | Lough Termiska | |
| Loch an Bhric Mhoir | Lough Aheeran | Lough Killaucrom | Lough Truska | |
| Loch an Chaolaigh | Lough Aill an Duilluir | Lough Knockaunawaddy | Lough Truskeena | |
| Loch an Chaorain | Lough Ailtarra | Lough Lawna | Lough Uggabeg | |
| Loch an Chriathraigh | Lough Aknockaunglass | Lough Lerin | Lough Uggamore | |
| Loch an Damba | Lough Aleckin | Lough Minnaun | Lough Wheelaun | |
| Loch an Doirin | Lough Aliggan | Lough Mongaun | Loughanillaun | |
| Loch an Iolra | Lough Aluggaun | Lough More | Loughanillaunmore | |
| Loch an Mhianaigh | Lough Alurgan | Lough na bhFaoilean | Loughaunalyer | |
| Loch an Oileainin | Lough an Ghioilcaigh | Lough na bhFaoilean Bheag | Loughaunanillaun | |
| Loch an Phuca | Lough Anaserd | Lough na Calgai | Loughaunanny | |
| Loch an Roisin | Lough Anillaunlughy | Lough na Circe Fraoigh | Loughaunayella | |
| Loch an Sainneach | Lough Aphastia | Lough na mBrobhach | Loughaunbeg | |
| Loch an tSeanbhaile | Lough Apheebera | Lough na Meannan | Loughauneala | |
| Loch an tSeangharrai | Lough Aroolagh | Lough Naboreeny | Loughauneeghaun | |
| Loch an tSruthain Dherg | Lough Arusheen | Lough Nabrocky | Loughaunemlagh | |
| Loch Aughaghadaí | Lough Astickeen | Lough Nabrough | Loughaunemlagheask | |
| Loch Barr anGhiobin | Lough Atawny | Lough Nabroughdoo | Loughaunfree | |
| Loch Beag | Lough Ateesky | Lough Nabrucka | Loughaunieran | |
| Loch Bharr an Sruthain | Lough Ateriff | Lough Nacalaga | Loughaunierin | |
| Loch Chaladh an Chnoic | Lough Atooreen | Lough Naclogh | Loughaunlettry | |
| Loch Charraig | Lough Atrista | Lough Nacorrossaunbeg | Loughaunnacrossy | |
| Loch Chlochiar Bo Bairtimeid | Lough Aturtaun | Lough Nacreeva | Loughaunnagun | |
| Loch Chloichrigh | Lough Aughawoolia | Lough Nacrogy | Loughaunnashingaun | |
| Loch Chnoc na Brocai | Lough Avally | Lough Nadullagh | Loughaunocary | |
| Loch Chroc na Luachra | Lough Awaddra | Lough Nafurnace | Loughaunore | |
| Loch Cluais Ghorria | Lough Barrcostello | Lough Nagappul | Loughaunultera | |
| Loch Dhuleitir | Lough Barnahask | Lough Nagarrivhan | Loughaunweeny | |
| Loch Dhuleitir Beg | Lough Bealacoan | Lough Nagraigue | Loughaunwillan | |
| Loch Doire an Fheich | Lough Bealanambrack | Lough Nagraivin | Loughawee | |
| Loch Fhada | Lough Beg | Lough Nagrove | Loughbeg | |

Table 2. Rock units in the GWB

| Unit name | Code | Description | Rock Unit | % Area |
|---|------|--|--|--------|
| Callowfinish Granite | GaCf | Monzogranite, small megacrysts | Granites & other Igneous Intrusive rocks | 4.9% |
| Carna Granite | GaCn | Granodiorite; grey | Granites & other Igneous Intrusive rocks | 1.2% |
| Carna-type | GaCn | Granodiorite; grey | Granites & other Igneous Intrusive rocks | 0.7% |
| Cloghmore Granodiorite | GaCl | Hornblende granodiorite, medium - coarse | Granites & other Igneous Intrusive rocks | 0.4% |
| Costello Murvey Granite | GaCt | Med-coarse leucocratic syenogranite | Granites & other Igneous Intrusive rocks | 2.4% |
| Cuilleen Granite | GaCu | Monzogranite; pink | Granites & other Igneous Intrusive rocks | 0.2% |
| Cuilleen-type | GaCu | Monzogranite; pink | Granites & other Igneous Intrusive rocks | 0.4% |
| Dolerite and Gabbro | D | Dolerite & gabbro, commonly silica poor | Granites & other Igneous Intrusive rocks | 0.0% |
| Errisbeg Townland Granite | GaEb | Megacrystic pink/grey monzogranite | Granites & other Igneous Intrusive rocks | 17.2% |
| Fine-grained foliated granite | Gf | | Granites & other Igneous Intrusive rocks | 0.0% |
| Granodiorite and diorite | Gd | | Granites & other Igneous Intrusive rocks | 0.2% |
| Knock Granite | GaKk | Pinkish medium to coarse grained granite | Granites & other Igneous Intrusive rocks | 2.1% |
| Lough Fadda Granodiorite | GaFd | Hornblende granodiorite, medium grained | Granites & other Igneous Intrusive rocks | 0.1% |
| Lough Lurgan Granite | GaLl | Pink-grey leucocratic granite | Granites & other Igneous Intrusive rocks | 1.6% |
| Magma Mixing-Mingling Zone | GaBz | Complex zone with dioritic enclaves | Granites & other Igneous Intrusive rocks | 4.5% |
| Marginal Porphyritic Granite | GaMm | Monzogranite, mafic, foliated | Granites & other Igneous Intrusive rocks | 0.8% |
| Metagabbro & orthogneiss suite | Om | Undifferentiated | Granites & other Igneous Intrusive rocks | 0.1% |
| Metagabbro and Related Lithologies | Mg | Hornblende metagabbros & metanorites | Granites & other Igneous Intrusive rocks | 9.2% |
| Murvey Granite | GaMu | Non-porphyritic syenogranite; pink | Granites & other Igneous Intrusive rocks | 2.8% |
| Oughterard Granite | OuGr | Medium/coarse non-porphyritic granite | Granites & other Igneous Intrusive rocks | 0.0% |
| Porphyritic-Megacrystic Granite | GaMp | Monzogranite, mafic, megacrystic | Granites & other Igneous Intrusive rocks | 24.7% |
| Quartz Diorite Gneiss | Qd | Quartz diorite orthogneiss | Granites & other Igneous Intrusive rocks | 6.9% |
| Quartz Diorite Gneiss & Granitic Gneiss | Qg | Quartz diorite & granitic orthogneisses | Granites & other Igneous Intrusive rocks | 1.2% |
| Quartz porphyry and Felsite | P | | Granites & other Igneous Intrusive rocks | 0.0% |
| Roundstone Granite | RoGr | Coarse non-porphyritic monzogranite | Granites & other Igneous Intrusive rocks | 2.5% |
| Shannapheasteen Granite | GaSn | Aphyric fine grained granite | Granites & other Igneous Intrusive rocks | 7.3% |
| Delaney Dome Meta-rhyolite Formation | DF | Mylonitized acid igneous rocks | Ordovician Volcanics | 0.4% |
| Lakes Marble Formation | LM | Marbles, metavolcanics, schists, grits | Precambrian Marbles | 0.0% |
| Ballyconneely Amphibolite | BaAm | Mylonitized metagabbro & related rocks | Precambrian Quartzites, Gneisses & Schists | 1.1% |
| Cashel Schist Formation | CL | Paragneiss, migmatite, pebble beds | Precambrian Quartzites, Gneisses & Schists | 3.9% |
| Lough Nacorussaun Metabasites | LnMb | Amphibolite, sometimes mylonitic | Precambrian Quartzites, Gneisses & Schists | 0.1% |
| Metadolerite | Md | Intrusive metadolerite, often schistose | Precambrian Quartzites, Gneisses & Schists | 0.0% |
| Mixed highly metamorphosed sediments | Pg | Mixed highly metamorphosed sediments | Precambrian Quartzites, Gneisses & Schists | 2.5% |
| Paragneiss, Migmatite and Hornfels | Pg | Mixed highly metamorphosed sediments | Precambrian Quartzites, Gneisses & Schists | 0.4% |
| Streamstown Schist Formation | ST | Psammitic pelitic & semi-pelitic schists | Precambrian Quartzites, Gneisses & Schists | 0.0% |

Table 3. Subsoils in the GWB.

| Parent Material | Code | %Area |
|-------------------|---------|--------|
| Alluvium | A | 0.05% |
| Blanket Peat | BkPt | 0.01% |
| Blanket Peat | BktPt | 64.15% |
| Cutover Peat | Cut | 0.03% |
| Lake | Lake | 4.79% |
| Lake islands | Lk_isle | 0.09% |
| Made ground | Made | 0.81% |
| Raised Beach Sand | Mbs | 0.03% |
| Rock at surface | Rck | 22.50% |
| Granitic Till | TGr | 5.20% |
| Metamorphic Till | TMp | 0.42% |
| Aeolian Sand | Ws | 0.17% |
| Nodata | nodata | 1.77% |

