Security classification: Public | March 2017

Groundwater dependent ecosystem mapping rule-sets for Wide Bay-Burnett

Version 1.5

Wide Bay-Burnett

Queensland Government

Groundwater dependent ecosystem mapping rule-sets

Groundwater dependent ecosystem mapping rule-sets are a combination of attributes (e.g. geology, rainfall, vegetation community, etc.) that describe the drivers, processes and interrelationships occurring between ecosystems and groundwater in a landscape based on local, expert knowledge. When applied to spatial data sets, these mapping rule-sets identify where ecosystems are or are potentially dependent on groundwater in a landscape.

Mapping rule-sets by catchment

Mapping rule-set	Drainage sub-basin											
	Baffle Creek	Barker and Barambah Creeks	Boyne and Auburn Rivers	Burnett River[1]	Burrum River	Elliott River	Fraser Island[2]	Gregory River	Isis River	Kolan River	Mary River[3]	Noosa River
Alluvial aquifer mapping rule-sets												
WBB_RS_01	X	X	X	X	X	X		X	X	X	X	X
WBB_RS_05	X			X				X	X			
WBB_RS_068	X		X	X				X	X	X	X	
WBB_RS_13			X									
Coastal sand mass aquifer mapping rule-set												
WBB_RS_02	X			X	X	X	X	X	X	X		X
Sedimentary rock aquifer mapping rule-set												
WBB_RS_03		X	X	X								
Permeable rock aquifer mapping rule-sets												
WBB_RS_04		X	X	X		X		X	X	X		
WBB_RS_07	X			X	X	X		X	X	X	X	X
WBB_RS_09		X	X								X	X
WBB_RS_12		X		X								
Catchment constriction mapping rule-set												
WBB_RS_11											X	

[1] Burnett River includes the Upper Burnett River and Lower Burnett River sub-basins.

[2] Fraser Island includes other miscellaneous islands.

[3] Mary River includes the Upper Mary River and Lower Mary River sub-basins.

Groundwater dependent ecosystem mapping rule-set descriptions

WBB_RS_01 (Alluvia–WBB)

Alluvial aquifers are formed from particles such as gravel, sand, silt and/or clay deposited by physical processes in river channels or on floodplains. These deposits store and transmit water through intergranular voids.

- Ecosystems potentially dependent on the surface expression of groundwater on alluvial aquifers include channels (represented by drainage lines, riverine water bodies and regional ecosystem 12.3.7b (*Eucalyptus tereticornis*, *Callistemon viminalis*, *Casuarina cunninghamiana* fringing forest)) and lacustrine and palustrine wetlands.
- Ecosystems potentially dependent on the subsurface presence of groundwater in alluvial aquifers include riverine regional ecosystems and any non–wetland vegetation. Non–wetland vegetation refers to regional ecosystems on river or creek flat alluvium (i.e. land zone three). Some minor areas of colluvium are also included.
- Areas that potentially contain surface ecosystems dependent on the surface expression or subsurface presence of groundwater are those areas on alluvium which exhibit seeps and soaks. A specified list of regional ecosystems fringing channels on alluvia indicates the presence of such environments.

WBB_RS_02 (Coastal sand masses–WBB)

Several large coastal sand masses and sand islands have developed along the Queensland coast including the Cooloola–Teewah area and Fraser Island in the Wide Bay–Burnett GDE mapping region. These coastal sand masses and sand islands often have one or more sand mass aquifers, where groundwater forms a freshwater lens in the intergranular voids of the sand mass.

- Ecosystems potentially dependent on the surface expression of groundwater from coastal sand masses include channels (represented by drainage lines and riverine water bodies) and lacustrine and palustrine wetlands below 50 metres elevation on the mainland and at any elevation on Fraser Island.
- Ecosystems potentially dependent on the subsurface presence of groundwater in coastal sand masses include non–wetland vegetation. For this mapping rule–set, non–wetland vegetation refers to regional ecosystems on coastal dunes (i.e. land zone two).

WBB_RS_03 (Unweathered sandstones–WBB)

Thick layers of porous sedimentary rock (such as sandstone, siltstone and conglomerate) form both confined and unconfined sandstone aquifers. In the Wide Bay–Burnett region this includes the Hutton, Marburg and Precipice Sandstones. This coverage includes sandstone formations in the Mulgildie Basin that forms part of the Great Artesian Basin.

- Ecosystems potentially dependent on the surface expression of groundwater from unweathered sandstones include channels (represented by drainage lines and riverine water bodies) and lacustrine and palustrine wetlands.
- Ecosystems potentially dependent on the subsurface presence of groundwater in unweathered sandstones include riverine regional ecosystems and non–wetland vegetation fringing channels. In addition low–lying non–wetland vegetation on unweathered sandstones are ecosystems potentially dependent on the subsurface presence of groundwater based on their floristic composition.

WBB_RS_04 (Permeable rocks including deeply weathered basalts [red soils]–WBB)

Deeply weathered basalts are permeable and may therefore store and transmit groundwater. This includes red soils, formed by the weathering of basalt, that are typically well–structured and well–drained permeable soils that readily store and transmit groundwater. In the Wide Bay–Burnett area this includes Tertiary duricrusted land surfaces such as the deeply weathered ferricrete of the Elliott and Grahams Creek Formations (near Childers) and the Main Range Volcanics (near Kingaroy).

- Ecosystems potentially dependent on the surface expression of groundwater from permeable rocks include channels (represented by drainage lines, riverine water bodies and regional ecosystem 12.3.7b (*Eucalyptus tereticornis*, *Callistemon viminalis*, *Casuarina cunninghamiana* fringing forest)) and lacustrine and palustrine wetlands. Channels incised into permeable rocks identified from expert knowledge as having potential or known baseflow (therefore as either potential or known ecosystems dependent on the surface expression of groundwater) are the Burnett River, Elliott River (including Gillens Creek and Mahogany Creek), Gregory River and Splitters Creek.
- Ecosystems dependent on the subsurface presence of groundwater, including riverine regional ecosystems and non–wetland vegetation, may be located on alluvia overlying permeable rocks.
- Areas that potentially contain ecosystems dependent on the surface expression or subsurface presence of groundwater are those areas on permeable rocks which exhibit seeps and soaks. Non–wetland regional ecosystems within 50 metres of permeable rocks (i.e. red soil) contact zone indicate the presence of such environments.

WBB_RS_05 (Alluvia on deeply weathered intrusive rocks [granites]–WBB)

Fractured impermeable rock (e.g. granite) may form aquifers that store and transmit groundwater through the voids created by the fracturing process. Fractured rock aquifers can be the result of the decomposition process associated with deeply weathered intrusive rocks. Groundwater may be transmitted from the fractured rock aquifers to overlying alluvia along foot slopes and narrow channel drainage lines.

- Ecosystems potentially dependent on the surface expression of groundwater from alluvia overlying deeply weathered granites include channels (represented by drainage lines and riverine water bodies) and lacustrine and palustrine wetlands fringing channels.
- Ecosystems potentially dependent on the subsurface presence of groundwater in alluvia overlying deeply weathered granites include riverine regional ecosystems and non–wetland vegetation fringing channels.

WBB_RS_068 (Alluvia on fractured rocks [granites and Agnes Water Volcanics]–WBB)

Fractured impermeable rock (e.g. granite) may form aquifers that store and transmit groundwater through the voids created by the fracturing process. Groundwater may be transmitted from the fractured rock aquifers to overlying alluvia along foot slopes and narrow channel drainage lines.

- Ecosystems potentially dependent on the surface expression of groundwater from alluvia overlying either granites or the Agnes Water Volcanics include channels (represented by drainage lines and riverine water bodies) and lacustrine and palustrine wetlands fringing channels.
- Channels, on alluvia overlying either granites or Agnes Water Volcanics, specifically identified from expert knowledge as having potential or known baseflow have been included as ecosystems dependent on the surface expression of groundwater.
- Ecosystems potentially dependent on the subsurface presence of groundwater in alluvia overlying either granites or the Agnes Water Volcanics include riverine regional ecosystems and non–wetland vegetation fringing channels.

WBB_RS_07 (Permeable rocks [Elliott Formation]–WBB)

The Tertiary Elliott Formation, located near Bundaberg in the Wide Bay–Burnett region, is composed of sandstone, conglomerate, siltstone, mudstone and shale. This Elliott Formation is a well–known and highly managed water–bearing aquifer.

- Ecosystems potentially dependent on the surface expression of groundwater from the Elliott Formation include channels (represented by drainage lines).
- Ecosystems potentially dependent on the subsurface presence of groundwater in the Elliott Formation occur where regional ecosystem 12.5.10 (*Banksia aemula* woodland on complex of remnant Tertiary surface and Tertiary sedimentary rocks) is dominant over regional ecosystems 12.5.9 (Sedgeland to heathland in low lying areas on complex of remnant Tertiary surface and Tertiary sedimentary rock) and 12.5.4a (*Eucalyptus* spp., *Corymbia* spp., *Melaleuca* spp. woodland on complex of remnant Tertiary surface and Tertiary sedimentary rocks).
- Areas that potentially contain ecosystems dependent on the surface expression or subsurface presence of groundwater are those areas on the Elliott Formation which exhibit seeps and soaks. Areas where regional ecosystems 12.5.9 (Sedgeland to heathland in low lying areas on complex of remnant Tertiary surface and Tertiary sedimentary rock) and 12.5.4a (*Eucalyptus* spp., *Corymbia* spp., *Melaleuca* spp. woodland on complex of remnant Tertiary surface and Tertiary sedimentary rocks) are dominant over regional ecosystem 12.5.10 (*Banksia aemula* woodland on complex of remnant Tertiary surface and Tertiary sedimentary rocks) are indicative of the presence of such environments.

WBB_RS_09 (High rainfall permeable rocks [basalts]–eMDB_WBB)

Basalt weathers and oxidises relatively quickly in comparison to other rocks. Weathered basalt is permeable and may form aquifers which store and transmit groundwater through the vesicles, fractures and weathered zones of the basalt. Basalts that occur in high rainfall areas (i.e. those areas with greater than 800 millimetres average annual rainfall) of the eastern Murray–Darling Basin and Wide Bay–Burnett are included such as the basalts in the Main Range Volcanics Formation that extend from Toowoomba to Kingaroy and beyond.

- Ecosystems potentially dependent on the surface expression of groundwater from high rainfall permeable basalt include lacustrine and palustrine wetlands. In additional channels on high rainfall permeable basalt and flowing up to one km from high rainfall permeable basalt are also ecosystems potentially dependent on the surface expression of groundwater.
- Ecosystems potentially dependent on the subsurface presence of groundwater in high rainfall permeable basalt include treed regional ecosystems.
- Areas that potentially contain ecosystems dependent on the surface expression or subsurface presence of groundwater include remnant regional ecosystems within 50m of the contact between permeable basalt and underlying less permeable rocks in high rainfall areas.

WBB_RS_11 (Catchment constrictions–eMDB_WBB)

Catchment constrictions are a narrowing in the width and/or depth of the catchment resulting in the formation of a catchment throat which acts as a 'bottle–neck' (Biggs et al., 2010). Often groundwater upslope of a catchment constriction is shallower due to the restriction of groundwater flow through the constriction point.

- Ecosystems potentially dependent on the surface expression of groundwater associated with catchment constrictions include any wetlands up to 500 metres upslope of an identified catchment constriction point in the eastern Murray–Darling Basin or Wide Bay–Burnett regions.

WBB_RS_12 (Permeable rocks [Barambah Basalt]–WBB)

The Barambah Basalt is a Pleistocene volcanic landform located east of Gayndah in the Wide Bay–Burnett region. Barambah Basalt is mainly composed of microphyric and vesicular olivine basalt. The Barambah basalt Formation contains the only volcanic crater lakes and lava tubes in South East Queensland. Groundwater is stored and transmitted in the fractures, vesicles and weathered zones of the olivine basalt.

- Ecosystems potentially dependent on the surface expression of groundwater from Barambah Basalt include channels (represented by drainage lines, riverine water bodies and regional ecosystem 12.3.7b (*Eucalyptus tereticornis*, *Callistemon viminalis*, *Casuarina cunninghamiana* fringing forest)) and lacustrine and palustrine wetlands.
- Ecosystems potentially dependent on the subsurface presence of groundwater in Barambah Basalt include riverine regional ecosystems and non–wetland vegetation. For this mapping rule–set, non–wetland vegetation refers to regional ecosystems on river or creek alluvium (i.e. land zone three) and regional ecosystems on basalt plains and hills (i.e. land zone eight).

WBB_RS_13 (Tertiary–Quaternary high–level alluvium [TQa]–WBB)

Tertiary–Quaternary high–level alluvium, or TQa, is a poorly consolidated or unconsolidated alluvial deposit in an ancestral valley which has been dissected by more recent channel activity. This process results in inverted relief whereby older alluvial deposits are higher in the landscape than younger alluvial deposits.

- Ecosystems potentially dependent on the surface expression of groundwater include channels on or extending from Tertiary–Quaternary high–level alluvium. In addition riverine water bodies, lacustrine and palustrine wetlands are ecosystems potentially dependent on the surface expression of groundwater.
- Ecosystems potentially dependent on the subsurface presence of groundwater include riverine regional ecosystems located within 50 metres of the contact between Tertiary–Quaternary high–level alluvium and other geologies.

Citation

Queensland Government (2017) *Groundwater dependent ecosystem mapping rule-sets for Wide Bay-Burnett: version 1.5*, Queensland Government, Brisbane.