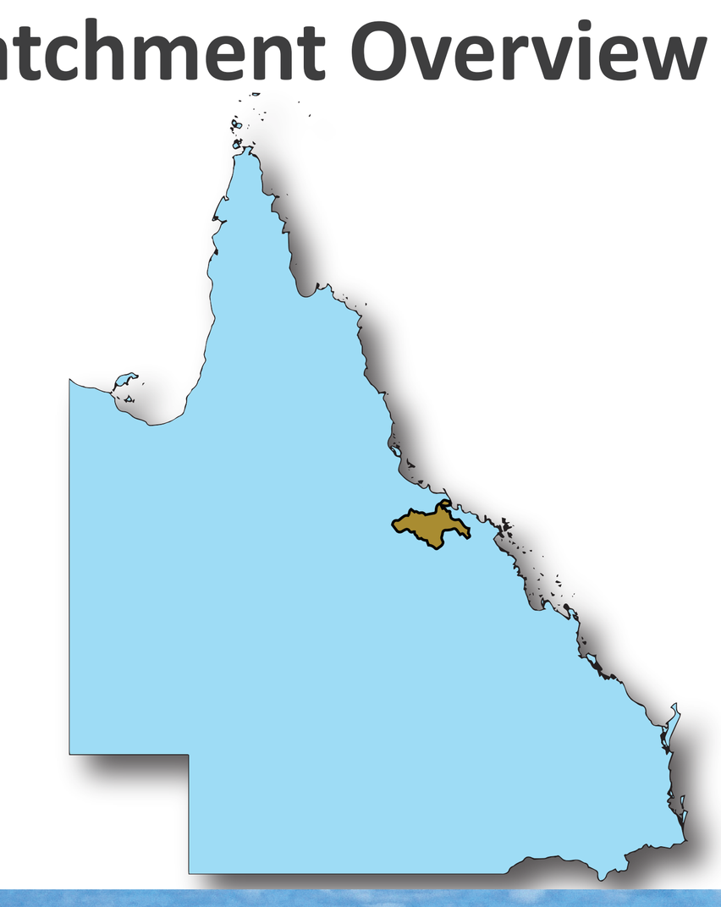
Lower Burdekin River Catchment
Local Knowledge Map

Resilient Queensland
Queensland Reconstruction Authority

QUEENSLAND GOVERNMENT

Catchment Overview

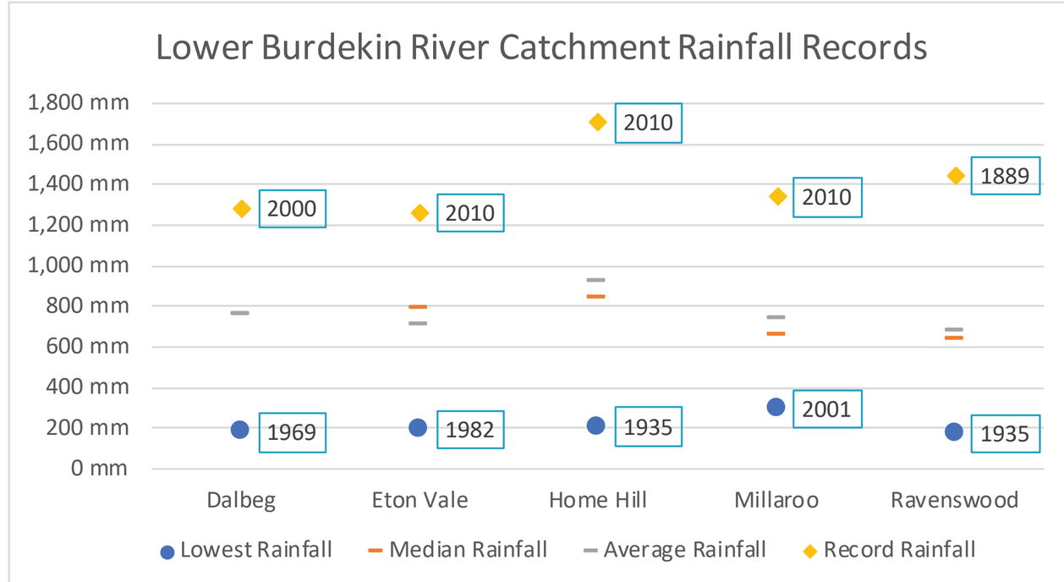


The Lower Burdekin River Sub-Catchment comprises the Burdekin and Bogie River sub-catchments, and takes in parts of two Local Government areas being the Burdekin Shire and Charters Towers Regional Council. The headwaters of the Burdekin River occur in the Upper Burdekin sub-catchment, with its upper reaches extending into parts of the Tablelands, while the headwaters of the Bogie River occur in the Burdekin Shire. The Burdekin River transverses both Council boundaries while the Bogie River is contained within the Burdekin Shire. Both systems flow in a northerly direction before draining into the Pacific Ocean. Each system is remarkedly responsive to rainfall and flood events during the monsoonal and cyclonic weather events.
Major towns situated in the Lower Burdekin River sub-catchment include Dalbeg, Home Hill, Millaroo and Ravenswood.

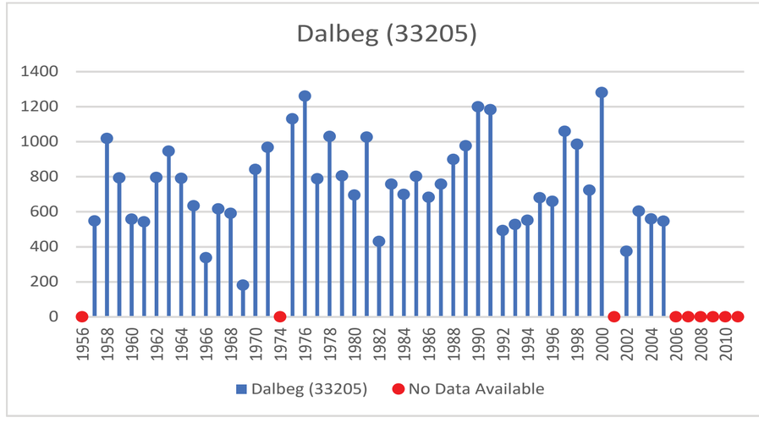
Climate & Rainfall

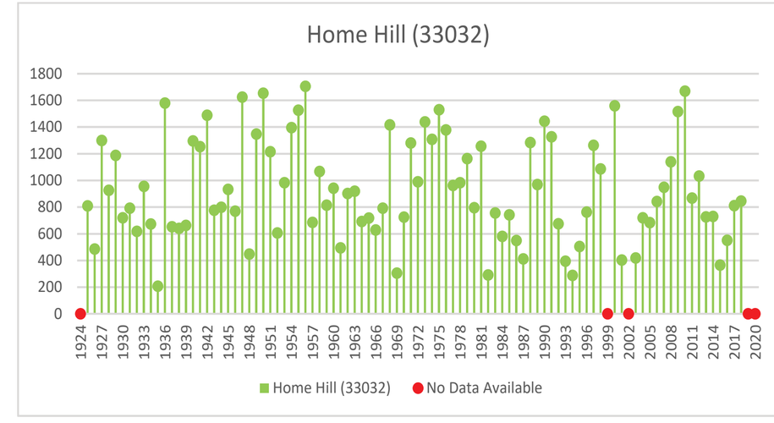
Weather and climate characteristics in the Lower Burdekin River sub-catchment in the last 30 years (1989 - 2018):

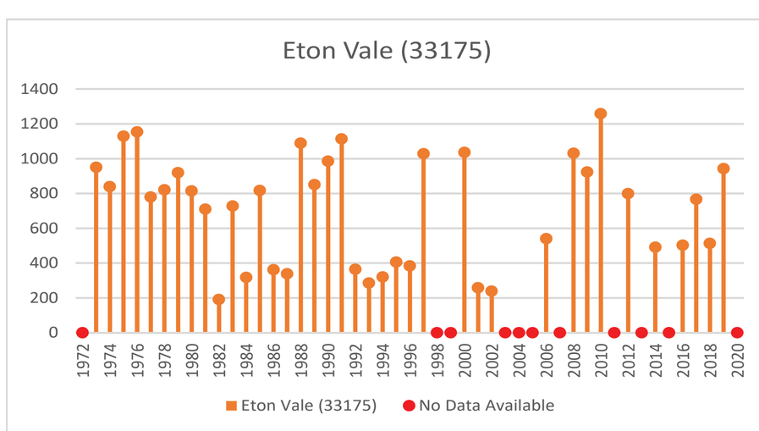
- The catchment is very responsive to rainfall from coastal influences, monsoons, tropical cyclones and depressions.
- Annual rainfall has been relatively stable, however growing season rainfall averages have decreased.
- In the last 30 years (1989-2018), dry years have occurred 12 times and wet years have occurred 12 times. The three-monthly rainfall totals leading into the dry season have increased slightly.
- The hydrological seasonality associated with wet and dry season flow conditions are critical to ecological charter, function and associated values of aquatic ecosystems. While these patterns provide the overarching driver for the system, on floodplains, the altered flow regimes associated with functioning of the dam and irrigation system are the drivers of impacts such as reduced water quality, weed infestation and barriers to fish passage.

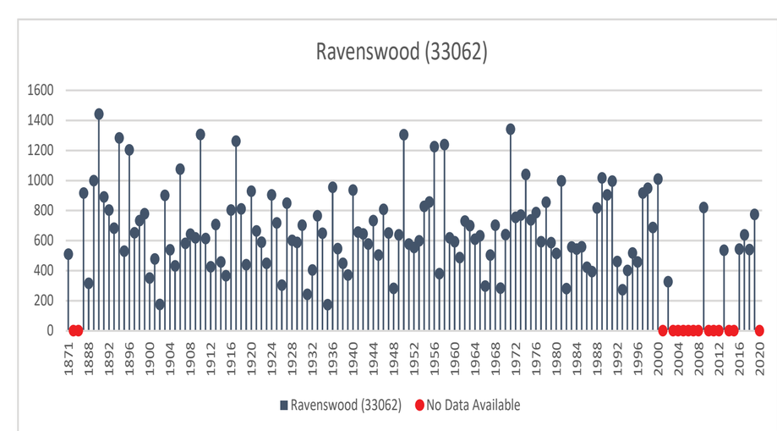


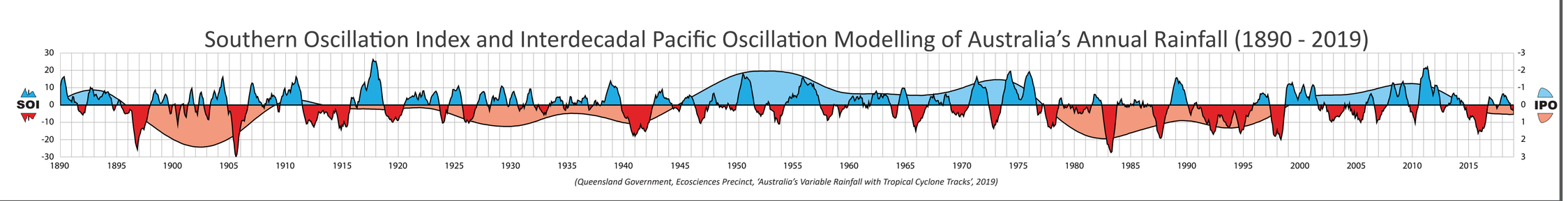
Lower Burdekin River Catchment Rainfall Records
1,800 mm
1,600 mm
1,400 mm
1,200 mm
1,000 mm
800 mm
600 mm
400 mm
200 mm
0 mm
2000
2010
2010
2010
1889
1969
1982
1935
2001
1935
Dalbeg
Eton Vale
Home Hill
Millaroo
Ravenswood
Lowest Rainfall
Median Rainfall
Average Rainfall
Record Rainfall









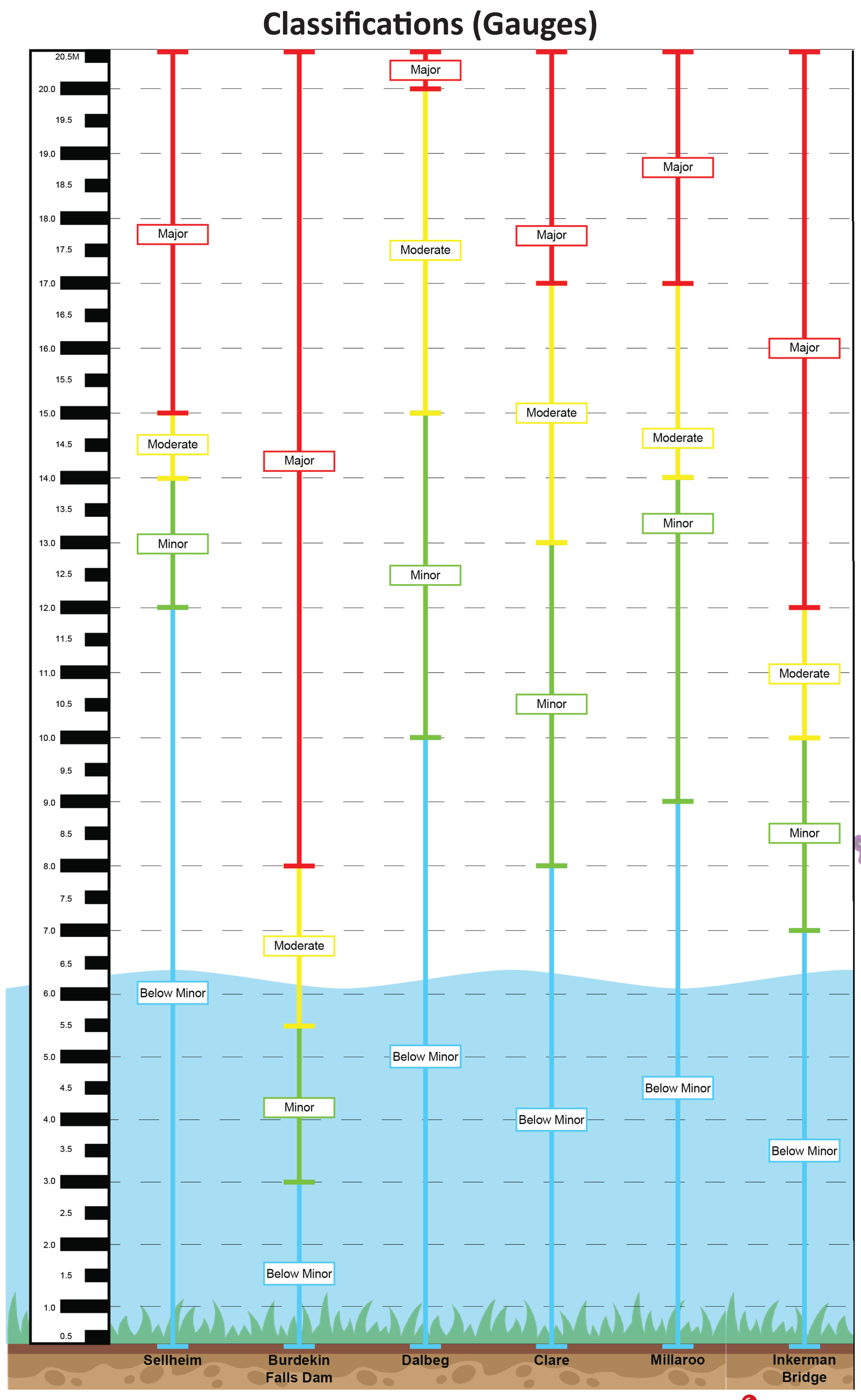


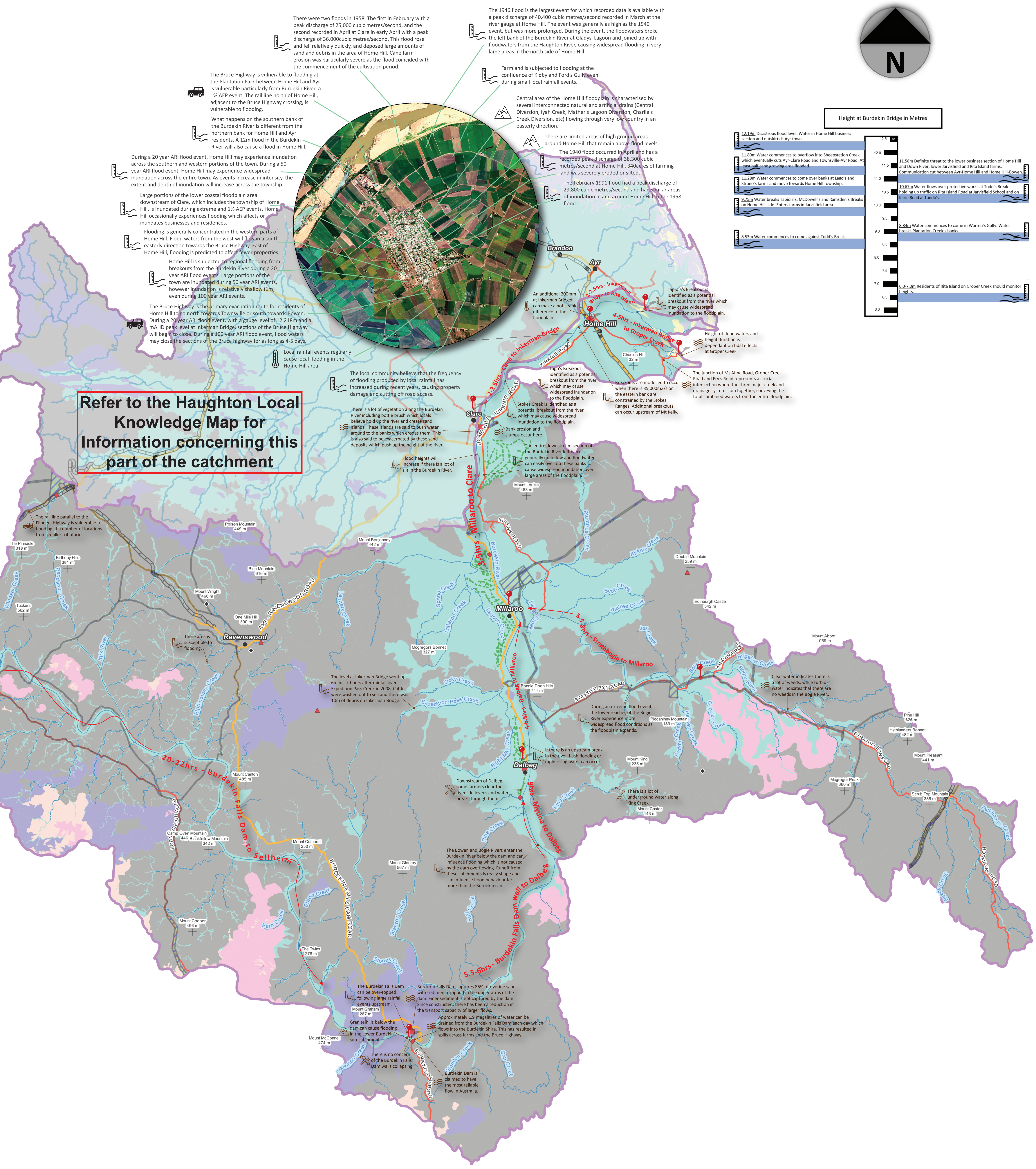
Southern Oscillation Index and Interdecadal Pacific Oscillation Modelling of Australia's Annual Rainfall (1890 - 2019)
SOI
IPO
(Queensland Government, Ecosciences Precinct, 'Australia's Variable Rainfall with Tropical Cyclone Tracks', 2019)

How to use this guide:

The information below provides local knowledge on landscape characteristics and flood behaviour. This is provided for local land managers, Council staff, and State Government officers to better understand the Lower Burdekin River Catchment and its unique characteristics. This guide has used the best available information at present. It is intended to help you assess what type of flood is likely to occur in your area and indicate what amount of feed you might expect. You may wish to record your own flooding and landscape characteristics on the map.

Lower Burdekin BoM Flood Classifications (Gauges)





There were two floods in 1958. The first in February with a peak discharge of 25,000 cubic metres/second, and the second recorded in April at Clare in early April with a peak discharge of 36,000cubic metres/second. This flood rose and fell relatively quickly, and deposed large amounts of sand and debris in the area of Home Hill. Cane farm erosion was particularly severe as the flood coincided with the commencement of the cultivation period.
The 1946 flood is the largest event for which recorded data is available with a peak discharge of 40,400 cubic metres/second recorded in March at the river gauge at Home Hill. The event was generally as high as the 1940 event, but was more prolonged. During the event, the floodwaters broke the left bank of the Burdekin River at Gladys' Lagoon and joined up with floodwaters from the Haughton River, causing widespread flooding in very large areas in the north side of Home Hill.
The Bruce Highway is vulnerable to flooding at the Plantation Park between Home Hill and Ayr is vulnerable particularly from Burdekin River a 1% AEP event. The rail line north of Home Hill, adjacent to the Bruce Highway crossing, is vulnerable to flooding.
Farmland is subjected to flooding at the confluence of Kidby and Ford's Gully even during small local rainfall events.
What happens on the southern bank of the Burdekin River is different from the northern bank for Home Hill and Ayr residents. A 12m flood in the Burdekin River will also cause a flood in Home Hill.
Central area of the Home Hill floodplain is characterised by several interconnected natural and artificial drains (Central Diversion, Iyah Creek, Mather's Lagoon Diversion, Charlie's Creek Diversion, etc) flowing through very low country in an easterly direction.
During a 20 year ARI flood event, Home Hill may experience inundation across the southern and western portions of the town. During a 50 year ARI flood event, Home Hill may experience widespread inundation across the entire town. As events increase in intensity, the extent and depth of inundation will increase across the township.
There are limited areas of high ground areas around Home Hill that remain above flood levels.
The 1940 flood occurred in April and has a recorded peak discharge of 38,300 cubic metres/second at Home Hill. 340acres of farming land was severely eroded or silted.
The February 1991 flood had a peak discharge of 29,800 cubic metres/second and had similar areas of inundation in and around Home Hill to the 1958 flood.
Large portions of the lower coastal floodplain area downstream of Clare, which includes the township of Home Hill, is inundated during extreme and 1% AEP events. Home Hill occasionally experiences flooding which affects or inundates businesses and residences.
Flooding is generally concentrated in the western parts of Home Hill. Flood waters from the west will flow in a south easterly direction towards the Bruce Highway. East of Home Hill, flooding is predicted to affect fewer properties.
Home Hill is subjected to regional flooding from breakouts from the Burdekin River during a 20 year ARI flood events. Large portions of the town are inundated during 50 year ARI events, however inundation is relatively shallow (1m) even during 100 year ARI events.
The Bruce Highway is the primary evacuation route for residents of Home Hill to go north towards Townsville or south towards Bowen. During a 20 year ARI flood event, with a gauge level of 12.218m and a mAHD peak level at Inkerman Bridge, sections of the Bruce Highway will begin to close. During a 100 year ARI flood event, flood waters may close the sections of the Bruce highway for as long as 4-5 days.
Local rainfall events regularly cause local flooding in the Home Hill area.
Height at Burdekin Bridge in Metres
12.19m Disastrous flood level. Water in Home Hill business section and outskirts if Ayr town.
11.89m Water commences to overflow into Sheepstation Creek which eventually cuts Ayr-Clare Road and Townsville-Ayr Road. At least half cane growing area flooded.
11.28m Water commences to come over banks at Lago's and Strano's farms and move towards Home Hill township.
9.75m Water breaks Tapiola's, McDowell's and Ramsden's Breaks on Home Hill side. Enters farms in Jarvisfield area.
8.53m Water commences to come against Todd's Break.
11.58m Definite threat to the lower business section of Home Hill and Down River, lower Jarvisfield and Rita Island farms. Communication cut between Ayr-Home Hill and Home Hill-Bowen.
10.67m Water flows over protective works at Todd's Break holding up traffic on Rita Island Road at Jarvisfield School and on Kilrie Road at Lando's.
8.84m Water commences to come in Warren's Gully. Water breaks Plantation Creek's banks.
6.0-7.0m Residents of Rita Island on Groper Creek should monitor heights.
N
Brandon
Ayr
Home Hill
Clare
Millaroo
Dalbeg
Ravenswood
2-2.5hrs - Inkermann Bridge to Rita Island
4-5hrs - Inkerman Bridge to Groper Creek
2-2.5hrs - Clare to Inkerman Bridge
3.5hrs - Millaroo to Clare
5.5-8hrs - Strathbogie to Millaroo
4-6.5hrs - Dalbeg to Millaroo
9hrs - Myuna to Dalbeg
5.5-6hrs - Burdekin Falls Dam wall to Dalbeg
20-22hrs - Burdekin Falls Dam to Sellheim
An additional 200mm at Inkerman Bridget can make a noticeable difference to the floodplain.
Tapiola's Breakout is identified as a potential breakout from the river which may cause widespread inundation to the floodplain.
Height of flood waters and height duration is dependant on tidal effects at Groper Creek.
The junction of Mt Alma Road, Groper Creek Road and Fry's Road represents a crucial intersection where the three major creek and drainage systems join together, conveying the total combined waters from the entire floodplain.
Lago's Breakout is identified as a potential breakout from the river which may cause widespread inundation to the floodplain.
Breakouts are modelled to occur when there is 35,000m3/s on the eastern bank are constrained by the Stokes Ranges. Additional breakouts can occur upstream of Mt Kelly.
Stokes Creek is identified as a potential breakout from the river which may cause widespread inundation to the floodplain.
The local community believe that the frequency of flooding produced by local rainfall has increased during recent years, causing property damage and cutting off road access.
There is a lot of vegetation along the Burdekin River including bottle brush which locals believe hold up the river and create sand islands. These islands are said to push water around to the banks which erodes them. This is also said to be exacerbated by these sand deposits which push up the height of the river.
Bank erosion and slumps occur here.
The entire downstream section of the Burdekin River left bank is generally quite low and floodwaters can easily overtop these banks to cause widespread inundation over large areas of the floodplain.
Flood heights will increase if there is a lot of silt in the Burdekin River.
Charlies Hill 32 m
KIRKNIE ROAD
HOME HILL - KIRKNIE ROAD
Mount Louisa 488 m
Refer to the Haughton Local Knowledge Map for Information concerning this part of the catchment
The rail line parallel to the Flinders Highway is vulnerable to flooding at a number of locations from smaller tributaries.
The Pinnacle 318 m
Poison Mountain 449 m
Mount Benjonney 442 m
Birthday Hills 381 m
Blue Mountain 616 m
Mount Wright 466 m
Tuckers 562 m
One Mile Hill 390 m
AYR - RAVENSWOOD ROAD
There area is susceptible to flooding.
This road is a major supply line and trucks are unable to get through here during a flood.
Cornishman 345 m
MOUNT LEYSHON ROAD
Seventy Mile Mountain 435 m
Matthews Pinnacle 370 m
BRITTANY ROAD
Mount Farrenden 490 m
Windsor Creek
Pandanus Creek
Saltpan Creek
Kirk River
Broughton River
Cornishman Creek
Lighthouse Creek
Charlie Creek
Buff Creek
Deep Creek
Elphinstone Creek
Landers Creek
Plumtree Creek
Kirknie Creek
Double Mountain 259 m
Edinburgh Castle 542 m
Burdekin River
Spring Creek
Millaroo Creek
Lagoon Creek
Dego Creek
Scot Creek
Teatree Creek
Jet Creek
Mcgregors Bonnet 327 m
The level at Inkerman Bridge went up 6m in six hours after rainfall over Expedition Pass Creek in 2008. Cattle were washed out to sea and there was 10m of debris on Inkerman Bridge.
Oaky Creek
Expedition Pass Creek
Bonnie Doon Hills 211 m
STRATHALBYN ROAD
YONDARA ROAD
Bora Creek
Brigalow Creek
Bogie River
Mount Abbot 1059 m
Clear water indicates there is a lot of weeds, while turbid water indicates that there are no weeds in the Bogie River..
During an extreme flood event, the lower reaches of the Bogie River experience more widespread flood conditions as the floodplain expands.
Piccaninny Mountain 189 m
Paddys Creek
Heifer Creek
Capsize Creek
Pine Hill 626 m
Highlanders Bonnet 482 m
Mount Pleasant 441 m
Eight Mile Creek
If there is an upstream break in the river, flash flooding or rapid rising water can occur.
Mount King 235 m
Mcgregor Peak 360 m
Downstream of Dalbeg, some farmers clear the riverside levees and water breaks through them.
King Creek
There is a lot of underground water along King Creek.
Mount Castor 143 m
Scrub Top Mountain 385 m
Pickhandle Creek
NORMANBY ROAD
Reedy Creek
Pine Creek
The Bowen and Bogie Rivers enter the Burdekin River below the dam and can influence flooding which is not caused by the dam overflowing. Runoff from these catchments is really shape and can influence flood behaviour far more than the Burdekin can.
Mount Canton 485 m
Camp Oven Mountain 446
Blackfellow Mountain 342 m
LORA SLEIGH ROAD
Mount Cuthbert 250 m
BURDEKIN FALLS DAM ROAD
Mount Glenroy 567 m
Glenroy Creek
Bull Creek
Elbow Creek
Fern Creek
Mount Cooper 496 m
The Twins 278 m
Stones Creek
The Burdekin Falls Dam can be over-topped following large rainfall events upstream.
Burdekin Falls Dam captures 86% of riverine sand with sediment dropped in the upper arms of the dam. Finer sediment is not captured by the dam. Since constructed, there has been a reduction in the transport capacity of larger flows.
Mount Graham 287 m
Approximately 1.9 megalitres of water can be drained from the Burdekin Falls Dam each day which flows into the Burdekin Shire. This has resulted in spills across farms and the Bruce Highway.
Granite hills below the dam can cause flooding in the Lower Burdekin sub-catchment.
Mount McConnel 474 m
Cockatoo Creek
There is no concern of the Burdekin Falls Dam walls collapsing.
BURDEKIN DAM ROAD
Glendon Creek
Gap Creek
Burdekin Dam is claimed to have the most reliable flow in Australia.

Tips for Graziers

- Agriculture practices influence the sediment in waterholes and the water infiltration in the area. Sediment can also impact groundwater infiltration. Cattle and water are also mainly responsible for the spread of weeds and seeds.
- Farmers situated along the Burdekin River should try to avoid disrupting the soil between December to April as this may cause erosion.
- The average ground water level is 3m below crops. Crops will be affected when the ground water rises to 2m below the crop as this can increase salinity in the soil. The heavy reliance on groundwater to water farms has previously caused salinity issues.
- Farmers along the Burdekin River will try not to disrupt the soil from December to April as this may cause erosion.

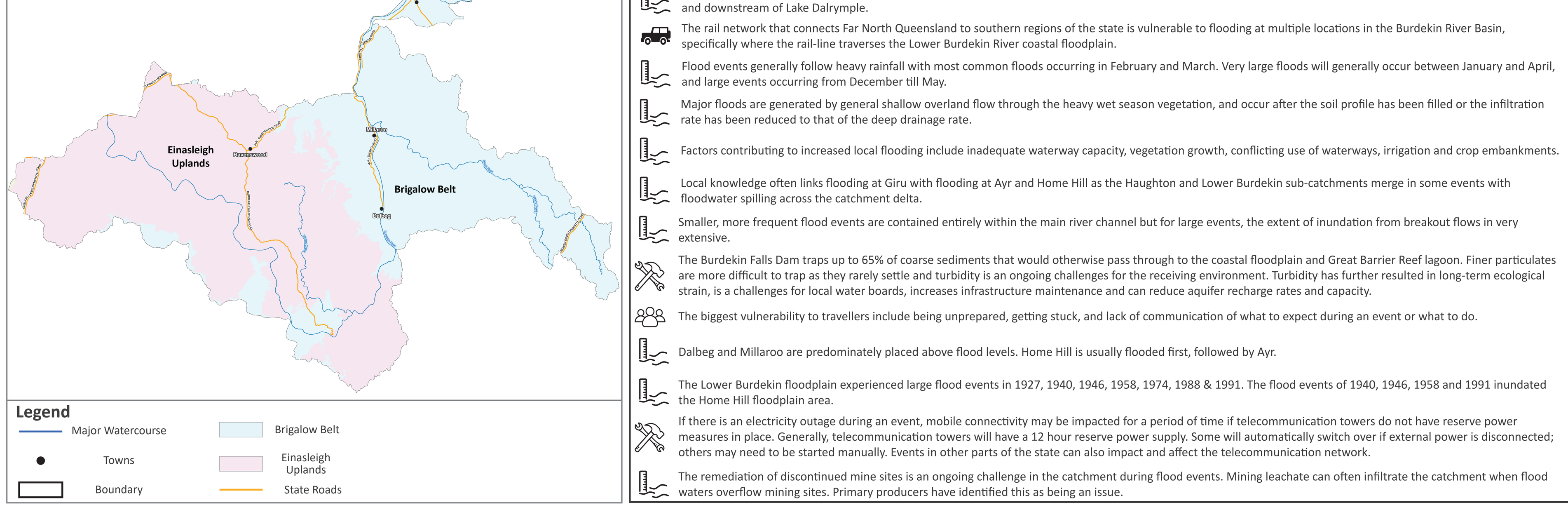
Handy Catchment Tips

- Where floods occur in succession, the second flood will travel slower due to vegetation that has grown from the first flood. The second flood will often flow clearer, because of the vegetation filtering more sediment out and slowing water flow.
- Flood travel times are dependent on many different variables. These include when and where the water hits the catchment, how wet the catchment was beforehand, whether there is vegetation in the catchment, recent modifications to the channels and throughout at the catchment, and water flowing in from other places.
- Alternating rainfall which contribute to flood events will often deposit large concentrations of sand and silt. Large sand deposits are often located further away from deep water.
- Vegetation plays an important role in slowing water movement across the landscape which not only helps retain surface water, but also reduces the potential for erosion to occur and reduced the associated issues with water quality and sedimentation further downstream. Reducing flow speed of runoff also plays an important role in protecting banks and part of the landscape prone to gully and rill erosion.
- River height readings from Dalbeg and Millaroo provide advanced warnings of flood floods.
- Local knowledge suggests that there will be breaks along the river banks when the soil has been saturated by a running river for a time and the water level drops, and then rises again quickly.
- A good indication that the underground water table is being recharged, is when the ground is bubbling during a major flood.
- The clearing of debris from tributaries can enhance the flow of water down the catchment. If debris is retained, this can mitigate fast flows and stop flooding.
- Weeds will often grow more quickly when the water is clear as opposed to when there is a lot of sediment.
- Alluvium concentration can often indicate sandy deposits along a system. Where a system also has a rocky creek or river bed can indicate that the system is fast flowing and has washed the sediment out.

Legend

Tidal flats and beaches	Flood related information
Coastal dunes	Agriculture/Feed information
Alluvial river and creek flats	Vegetation related information
Clay plains	Pinpoint between locations
Old loamy and sandy plains	Community related information
Inland dune fields	Water related information
Ironstone jump-ups	Fire related information
Basalt plains and hills	Infrastructure related information
Undulating country on fine grained sedimentary rocks	Climate related information
Consolidated sediments	Road and Transport related information
Sandstone ranges	Mining related information
Hills and lowlands on metamorphic rocks	Severe storm/weather related information
Hills and lowlands on granitic rocks	Property related information
Manual Gauge	Topography related information
Automatic Gauge	Towns
Stock Route	Mines
Cat D Proposed Gauges	State Controlled Roads
Mountains	Train Line
Irrigation System	Irrigation System
	Watercourses
	Tropical Cyclone/Cyclonic related weather

Lower Burdekin River Catchment Bioregions



General Risk Awareness Information

- The 1991 flood season was unique as floodwaters stemmed from every part of the catchment. The persistent prescence of a two month monsoonal trough made the catchment very responsive to large rainfall over the catchment during this period.
- The water discharge record of the Lower Burdekin is one of the best in Queensland.
- The experience of 1991 suggests that storage effects and persistence of discharge from the Burdekin Dam can add to the level of flood height in the Lower Burdekin, however water released from the dam during a flood is controlled and steady. The dam is a an artifical channel to constrict flows from the upper catchment.
- The main point for river height readings in the Burdekin Shire Council is the gauge at the Burdekin Bridge at Carstairs, Home Hill.
- The Ayr-Dalbeg, Barratta, School, Ayr-Ravenswood and Burdekin Falls Dam Roads are vulnerable to flooding from the Burdekin River in the 1% AEP event.
- Burdekin River Basin is capable of producing severe flooding conditions following heavy rainfall causing inundation of properties and closure of main roads both upstream and downstream of Lake Dalrymple.
- The rail network that connects Far North Queensland to southern regions of the state is vulnerable to flooding at multiple locations in the Burdekin River Basin, specifically where the rail-line traverses the Lower Burdekin River coastal floodplain.
- Flood events generally follow heavy rainfall with most common floods occurring in February and March. Very large floods will generally occur between January and April, and large events occurring from December till May.
- Major floods are generated by general shallow overland flow through the heavy wet season vegetation, and occur after the soil profile has been filled or the infiltration rate has been reduced to that of the deep drainage rate.
- Factors contributing to increased local flooding include inadequate waterway capacity, vegetation growth, conflicting use of waterways, irrigation and crop embankments.
- Local knowledge often links flooding at Giru with flooding at Ayr and Home Hill as the Haughton and Lower Burdekin sub-catchments merge in some events with floodwater spilling across the catchment delta.
- Smaller, more frequent flood events are contained entirely within the main river channel but for large events, the extent of inundation from breakout flows in very extensive.
- The Burdekin Falls Dam traps up to 65% of coarse sediments that would otherwise pass through to the coastal floodplain and Great Barrier Reef lagoon. Finer particulates are more difficult to trap as they rarely settle and turbidity is an ongoing challenges for the receiving environment. Turbidity has further resulted in long-term ecological strain, is a challenges for local water boards, increases infrastructure maintenance and can reduce aquifer recharge rates and capacity.
- The biggest vulnerability to travellers include being unprepared, getting stuck, and lack of communication of what to expect during an event or what to do.
- Dalbeg and Millaroo are predominately placed above flood levels. Home Hill is usually flooded first, followed by Ayr.
- The Lower Burdekin floodplain experienced large flood events in 1927, 1940, 1946, 1958, 1974, 1988 & 1991. The flood events of 1940, 1946, 1958 and 1991 inundated the Home Hill floodplain area.
- If there is an electricity outage during an event, mobile connectivity may be impacted for a period of time if telecommunication towers do not have reserve power measures in place. Generally, telecommunication towers will have a 12 hour reserve power supply. Some will automatically switch over if external power is disconnected; others may need to be started manually. Events in other parts of the state can also impact and affect the telecommunication network.
- The remediation of discontinued mine sites is an ongoing challenge in the catchment during flood events. Mining leachate can often infiltrate the catchment when flood waters overflow mining sites. Primary producers have identified this as being an issue.

General Landscape Knowledge

- Water movement in the Lower Burdekin area has been substantially altered by the Burdekin Falls Dam and irrigation for cane farming. The altered flow regimes are drivers of impacts such as reduced water quality, weed infestation and barriers to fish passage. Increased local flooding is also mostly attributed to the uncontrolled growth of aquatic weeds in natural watercourses that impede the flow of water.
- The banks of the Burdekin are dynamic and constantly moving as a result of erosion and sediment transport and deposition from upstream areas. This makes snapshots in time are unreliable as the sand in the Burdekin River is constantly moving.
- The volume of rainfall in one area of the catchment does not reflect the whole catchment.
- A large proportion of the land is used for grazing on native pastures, irrigated sugar cane and residential and associated services.
- The lower channel crosses the western part of the Burdekin floodplain and loses capacity in a downstream direction, causing widespread overbank flow. The joint floodplain is drained by Barratta Creek which receives overbank discharges from both the Haughton and Burdekin and also floods from it's own catchment.
- There are conservation and natural areas across the catchment. Protected areas are particularly located in the northern quadrant of the catchment. Bowling Green Bay is a Ramsar site and a declared Dugong Protection Area.
- Grazing is one of the main regional land uses due to a sizeable area of the landscape has been degraded through a combination of land clearing, historical fire use, and overstocking through the long dry winter, spring and early summer period.
- All waterways meet on a broad floodplain and flow into the GBR via Upstart Bay.
- The Burdekin River, in the Lower Burdekin Catchment, has a wide sandy bed while the riparian zones are typically vegetated with grass and large trees or mangroves in the lower reaches.
- Water quality issues across the wider Burdekin region are associated with: fine sediments and turbidity or total suspended sediments (TSS); dissolved inorganic nitrogen (DIN) and participate nutrients; photosystem-II inhibiting herbicides (PSII herbicides); and- low dissolved oxygen.
- Ground water systems are recharged by: rainfall infiltration; seepage from the beds and banks of the Burdekin River and other waterways and channels; overland floods; inflow from bedrock and adjacent areas; and irrigation application, irrigation return flows and tailwater.
- Over the last 20 years, increased deep drainage into the underlying aquifer has resulted in a rise in groundwater levels. Irrigating is acknowledged as a major factor to increasing deep drainage, however there are other contributing factors like land use change.
- Both the Bogie and Bowen Rivers are siltier than the Burdekin River.
- The bathymetery of the Burdekin upstream of the weir changed after the 2019 event. It moved a lot of sand and sediment downstream. There is a lot of groundwater movement in the Burdekin and Haughton catchments. Often half the Burdekin can be flooding while the Haughton is not and vice versa.
- The Bowen sub-basin has a major impact on the hydrology and water movement of the Lower Burdekin below the dam. Large flows on water flow out of the Bowen River and into the Burdekin River following heavy rainfall over the Bowen sub-basin. Below the dam, large volumes of water also flow into the Burdekin River from the Bogie river and several other tributaries draining steep and hard granite slopes, following heavy rainfall.

Map Authors: