

Memo

Iron Bridge Pools – High Ecological Value Aquatic Ecosystem Evaluation

OUR REF	GV-0000-AS-EN-0002	DATE	24-Feb-25
TO	Ying Yu, Michael Carroll	CC	Matt Dowling
FROM	Damien Cancilla, Vlad Rios Vera		

The Aquatic Ecosystems Toolkit is a series of documents developed by the Commonwealth Government to guide the identification of high ecological value aquatic ecosystems. The modules in the series are:

Module 1: Aquatic Ecosystems Toolkit Guidance Paper

Module 2: Interim Australian National Aquatic Ecosystem (ANAE) Classification Framework

Module 3: Guidelines for Identifying High Ecological Value Aquatic Ecosystems (HEVAE)

Module 4: Aquatic Ecosystem Delineation and Description Guidelines

Module 5: Integrated Ecological Condition Assessment (IECA) Framework

Module 3 Guidelines for Identifying High Ecological Value Aquatic Ecosystems (HEVAE) provides a set of non-prescriptive steps to guide proponents in the groundwork required and process of identifying HEVAE (Aquatic Ecosystems Task Group, 2012).

The HEVAE framework advocates using five key criteria (diversity, distinctiveness, naturalness, vital habitat and representativeness), all of which have been adopted for the evaluation of pools mapped within and in the area of influence of the Iron Bridge mine.

This memo provides the rationale and describes the methods used to assess the ecological value for each of the five criteria used. This memo also examines limitations of the methods and discusses how these have been addressed when undertaking the evaluation.

Indicators Selected

Several indicators were selected for the five key criteria adopted. These were selected based on existing knowledge of riverine systems in the Pilbara region and availability of data.

1. Diversity

- Fish richness: The proportion of species recorded (based on the maximum possible species based on species distribution) determines a score of high, medium or low.
- Macroinvertebrates richness: The value of taxonomic richness recorded determines a score of high, medium or low.

Macroinvertebrates richness was assigned a higher weight than fish richness due to their ability to colonise all surface water pools. Fish require connectivity to other pools to allow colonisation events to occur.

2. Distinctiveness

- Significant or endemic flora or vegetation species records: The presence and abundance of significant or endemic flora species or vegetation types determines a score of high, medium or low.



- Significant or endemic invertebrates records: The presence and abundance of significant or endemic invertebrates determines a score .
- Significant or endemic fish species records: The presence and abundance of significant or endemic fish species determines a score of high, medium or low.
- Significant or endemic amphibian species records: The presence and abundance of significant or endemic amphibian species determines a score.
- Significant or endemic terrestrial fauna species records: The presence and abundance of significant or endemic terrestrial vertebrate fauna species determines a score of high, medium or low.

Even weighting for each sub criteria was selected as the presence of significant or endemic species from each group is considered equally important to determining the distinctiveness of a pool.

3. Vital Habitat

- Significant terrestrial fauna habitat: The presence of fauna habitats mapped or identified as critical or supporting (foraging or dispersal) habitat for significant fauna species.
- Breeding habitat for fish: The presence of suitable aquatic habitat features that allow successful breeding to occur.
- Catchment disturbance level: The level of current disturbance that occurs within the catchment associated with the pool.
- Water presence. The amount of time over an annual period (averaged over at least 10 years) that surface water is present within the pool (Hydrobiology, 2025). This is divided into Permanent pools, Commonly Wet, Seasonally Inundated and Periodic Inundation/Ephemeral)

Catchment disturbance level was assigned a lower weighting whilst all other indicators were assigned the same higher weighting.

4. Naturalness

- Hydrologic stress: The presence of human derived factors that alter the availability of water within the catchment to the pool.
- Water quality: Water quality attributes that are suitable for the presence of diverse aquatic communities (i.e. low salinity, neutral pH, low dissolved material etc)

Due to the Pilbara region having limited developments that alter the availability of water within catchments, resulting in the majority of pools being under low hydrological stress, water quality was weighted higher than hydrological stress

5. Representativeness

- Best of its type in regional area or contains habitats that are under-represented in the region

This score is recommended to be completed after the first four criteria are assessed. This will allow pools that represent aquatic ecosystems with the highest ecological value to be identified.

Calculating Scores

Weighted averages were calculated to assign individual scores for each of the five key criteria. The maximum possible score for each of the criterion was 1.

The final or overall HEVAE score was determined for each pool by adding together the final scores for each criterion which resulted in a maximum possible score of 5.



A five-class system was adopted (Table 1) to display the five classes and overall score HEVAE outputs. Using this type of classification is an accepted practice in waterway assessment (NSW Department of Industry, 2018).

Table 1: Classes used to indicate overall HEVAE

Score Range	HEVAE Class
4.01 – 5.00	Very High Value (Regional)
3.01 – 4.00	High Value (Local)
2.01 – 3.00	Medium Value (Local)
1.01 – 2.00	Low Value
0.00 – 1.00	Very Low Value

The assessment of each pool was completed using the following assumptions

- Pools that have suitable data available were assessed based on this historical data.
- Pools that have not been surveyed were assessed based on the estimated permanence of the water data and the corresponding data recorded from similar pools (i.e. permanent pools on the average data collected from pools such as Mundagoora, Cow Pool and Fig pool).
- Aerial imagery was used to determine the presence of potentially groundwater dependent vegetation (Eucalypts or Melaleuca), potentially critical fauna habitats (Gorges, Cliffs etc) and the regional context of each pool (height in landscape, connectedness to other pools etc).
- Conservative assumptions were made regarding water quality, and the presence of macroinvertebrate and fish diversity for unsurveyed pools. For example - All permanent pools were assumed to have good water quality and suitable habitat for fish breeding. All ephemeral pools were assumed to have variable water quality and potential breeding habitat.
- All pools with no available data were assessed as having no significant or endemic invertebrate, fish, or frog species. This was an assumption based on the data from all the surveyed pools which did not record any significant or endemic species.

Evaluation Results

Table 2 summarises the results of the HEVAE evaluation. From the 31 pools evaluated, 16 pools were identified as having medium, high or very high ecological value. All other pools were identified as pools with low or very low ecological value. Details of the individual scores for all pools and criteria indicators are included in Attachment A.



Table 2: HEVAE Evaluation Results

HEVAE Class	Pool ID Number/Name
Very High Value (Regional)	Mundagoora, 42 Reach 93 GE_4
High Value (Local)	Reach Site 12 Cow Spring 126 – Craigs Pool Lower
Medium Value (Local)	GE_10 100 105 Reach 119 127 – Astrid Bee Cave Reach 97 – Zanes Gorge 98 – Dingo Lair GE_5 GE_6
Low Value	Fig Reach 56 – Pool_GV_SW Reach 62 (includes Pool_GR and 2 other pools) 52 – NJA19-002 NJA19-004 50 51 – GV_SW_WRD_01 Reach 57 59 IB_SW_DryReject_DS_02 9
Very Low Value	60 - Central Creek NJA21-006_US NJA21-006_DS 11

Damien Cancilla
Senior Environmental Specialist

Vlad Rios Vera
Senior Environmental Advisor



References:

Aquatic Ecosystems Task Group (2012). Aquatic Ecosystems Toolkit. Module 3: Guidelines for Identifying High Ecological Value Aquatic Ecosystems (HEVAE). Australian Government Department of Sustainability, Environment, Water, Population and Communities, Canberra

NSW Department of Industry (2018), Applying the High Ecological Value Aquatic Ecosystem (HEVAE) Framework to Riverine Ecosystems. NSW Department of Industry Water, Parramatta.

Hydrobiology (2025), NSE Pools Characterisation



Attachment A: Iron Bridge Pools HEVAE Evaluation Results

