# Carmichael Coal Mine and Rail Project
# Supplementary Environmental Impact Statement

## Volume 4, Appendix C3i – Mistake Creek Water Application

Containing

- Water permit application for the taking of water for the construction of the Carmichael Rail Project (SP1)

# Water permit application for the taking of water for the construction of the Carmichael Rail Project (SP1)

September 2013

# Table of Contents

# 1. Introduction

This information supports an application for water permit for the taking of water for construction purposes associated with the Carmichael Coal Rail Project (SP1 Alignment – see *Figure 1*).

The Carmichael Coal Rail Project (the Project) involves the construction of a rail line connecting the Carmichael mine site to the existing Goonyella and Newlands rail systems to provide for the export of coal via the Hay Point and Abbot Point coal terminals.

The rail project requires water for construction activities, for example earthworks/civil works, batching plants and construction camps. Required water quality will vary dependent upon the proposed end use. For example, earthworks require raw water whereas concrete batching requires water to Australian Standard (AS1379) and construction camps require potable water.

Desktop analysis by Hyder Consulting in their report dated 13th August 2012 (hereafter referred to as the Hyder Report) has identified a construction water strategy for specific locations along the proposed rail line that require water. The report outlines the preferred options for obtaining water whether it is groundwater, surface water (e.g. overland flow or existing supply) or potable water.

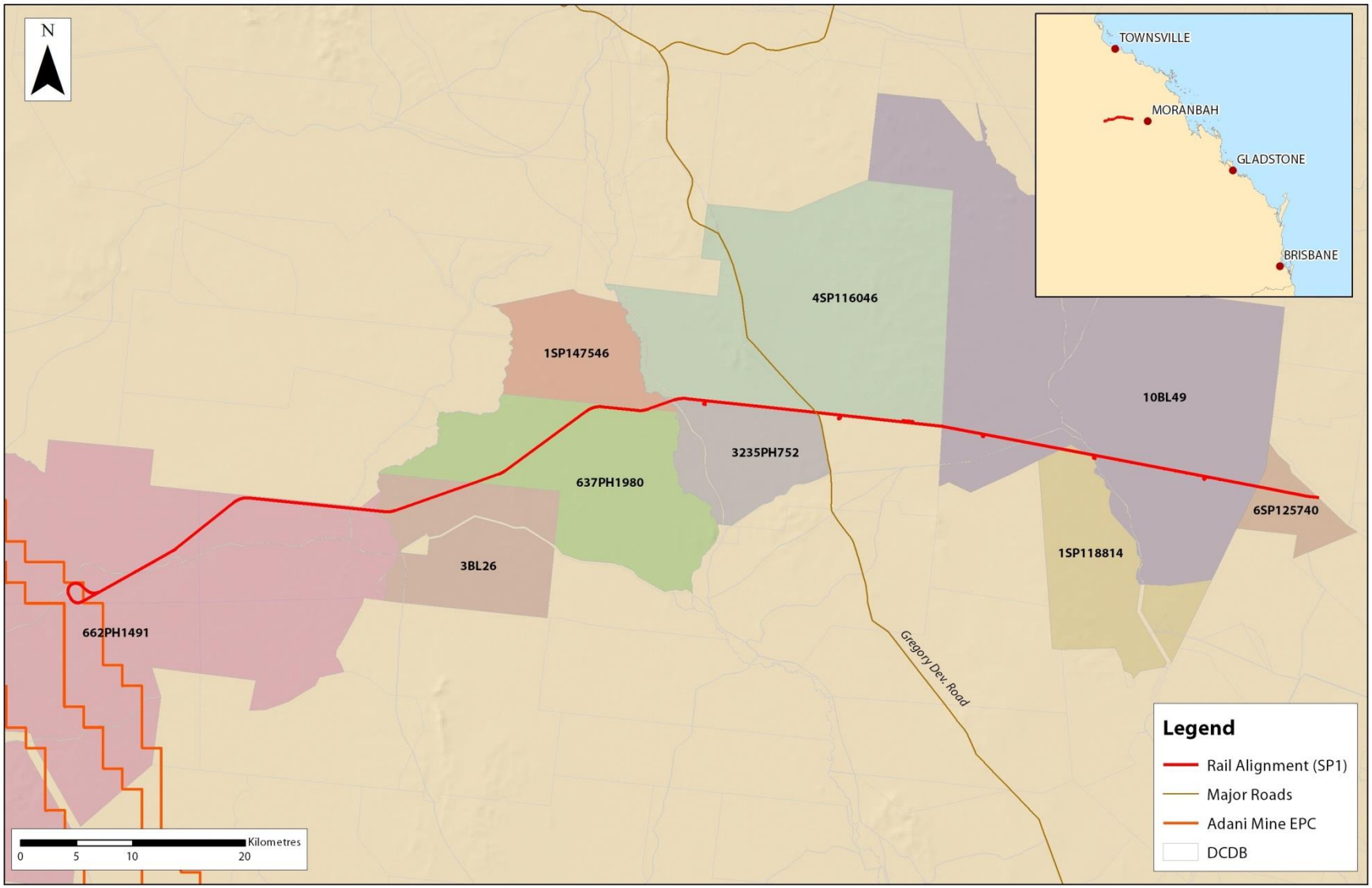
The report identified 17 water supply points (SP1 only) along the rail corridor where a water supply would be required – supply points typically require approximately 450kL of water per day. Of the 17 supply points, the Hyder Report recommends that groundwater be investigated as a supply option at 13 of these locations and that surface water supplement any groundwater supply. Hyder reviewed three catchment areas that potentially contained enough water to supplement the required volumes - Diamond Creek, Logan Creek and Mistake Creek.

This report relies upon the Hyder Consulting report findings and recommendations and has been prepared in order to obtain a permit for surface water extraction from Mistake Creek to supplement the Project water supply.

## 1.1. Project Summary

| | |
|---|---|
| **Location** | Carmichael Coal Rail Project – SP1 rail alignment |
| **Application Purpose** | Obtaining permit to take water (surface water) under the *Water Act 2000* at from Mistake Creek |
| **RPD (SP1 rail alignment)** | Lot 662PH1491<br>Lot 3 BL26<br>Lot 637 PH1980<br>Lot 4 SP116046<br>Lot 10 BL49<br>Lot 1SP118814<br>Lot 6 on SP125740 |
| **Local Government** | Isaac Regional Council |

**Figure 1: Carmichael Coal Rail Project Overview (SP1)**



# 2. Application Details – Overview

*Table 1 – Surface Water Summary* below outlines the proposed taking of water from Mistake Creek, the details of the location, proposed volume of water required for construction and the purpose for taking the water.

**Table 1: Surface Water Summary**

| | |
|---|---|
| **Number of locations** | 1 (Refer to Plan 2 - Proposed Surface Water Location) |
| **Purpose** | **Location** / **Name** / <br> 1 / Mistake Creek / Construction of Carmichael Coal Rail Project (SP1 Alignment) |
| **Dates of Construction (Estimation)** | **Location** / **Name** / <br> 1 / Mistake Creek / 1 October 2014 to 29 April 2015 |
| **Source Watercourse** | Mistake Creek |
| **Location (GDA94 – MGA55)** | **Location** / **Northing** / **Easting** <br> 1 / 7588817N / 487801E |
| **Maximum Rate of Extraction** | 25 litres per second (floating pump) |
| **Required Water Quality** | Either AS1379 or Potable (Raw water only is required for earthworks) |
| **Volume Required/Day** | **Location** / **Name** / <br> 1 / Mistake Creek / 2.16ML |
| **Volume Required/Year** | **Location** / **Name** / <br> 1 / Mistake Creek / 350ML |
| **Volume Required (Total)** | **Location** / **Name** / <br> 1 / Mistake Creek / 700ML |
| **Permit Timeframe** | October 2014 to October 2016 (2 years) |

# 3. Background

The Project involves the construction of a rail line connecting the Carmichael mine site to the existing Goonyella and Newlands rail systems to provide for the export of coal via the Hay Point and Abbot Point coal terminals and has been designed to carry 100 million tonnes per annum of coal.

The Project has been declared a 'significant project' under the State Development and Public Works Organisation Act 1971 (SDPWO Act) and as such, an Environmental Impact Statement (EIS) is required for the Project.

The rail line is divided into several different portions. This application is concerned only with Separable Portion 1 (SP1), which is known as 'west rail' which traverses approximately 120km from the Carmichael Coal Mine (mining lease area) east towards Moranbah. Refer to *Figure 1- Carmichael Coal Rail Project Overview*.

## 3.1. Existing Water Supply Study

Hyder Consulting have produced a report dated 13th August 2012 (the Hyder Report) which outlines a strategy for obtaining construction water for the SP1 rail alignment. The report identifies a total of 17 locations for construction water to be obtained for the purposes of civil works, construction camps, batching plants, a maintenance yard and a construction depot.

The Hyder Report found that along the length of the rail corridor, there were few reliable water supply sources available in all months of the year. As a result, at a majority of supply locations the report recommends that water be sourced from groundwater bores and supplemented by a variety of other sources, including surface water.

A number of options have been considered for surface water sources within the Hyder Report. These include existing large storage dams, in line and offline storage and minor overland flow capture structures. The search was limited to within 1-2 kms of the proposed railway.

The Hyder Report reviewed three catchment areas that potentially contained enough surface water to supply the required construction volumes - Diamond Creek, Logan Creek and Mistake Creek. A summary of the surface water supply options is included within *Table 2 – Surface Water Options (Existing Storages).*

**Table 2: Surface Water Options (Existing Storages)**

| Surface Water Supply | Location | In-stream/Off-stream Storage | Option Number | Purpose |
|---|---|---|---|---|
| **Existing Dam** | Lot 2 on GV248 | Off-stream | 3 | Earthworks |
| **Existing Dam** | Lot 5 DC138 | Off-stream | 3 | Batching Plant 2 |
| **Existing Dam** | Lot 5 on SP125740 | Off-stream | 3 | Earthworks |
| **Lambing Lagoon (Off Stream)** | Lot 6 on SP125740 | Off-stream | 3 | Earthworks |
| **Lambing Lagoon (Diamond Creek)** | Lot 6 on SP125740 | In-stream | 3 | Earthworks |
| **Avon Lagoon (Logan Creek)** | Lot 10 on BL49 | In-stream | 1 | Batching Plant |
| **Disney Offline Storage & Gravity Diversion (Mistake Creek)** | Lot 4 on SP116046 | Off-stream | 3 | Earthworks |

## 3.2. Mistake Creek

Within sections SP1 of the proposed railway there exists three major waterways that have enough water to supply the required volumes of water required at a reasonable reliability. They include Mistake Creek, Diamond Creek and Logan Creek at the points at which they cross the proposed railway. Mistake Creek partially traverses the 'Disney' property – Lot 4 on SP116046 and has a catchment area of 8048km² - the largest catchment of the identified waterways.

Mistake Creek had the highest mean daily flows (year round) out of any of the investigated watercourses (see *Table 3* below) and has been identified as a potential water source for the Project.

**Table 3 – Estimated Mean Daily Flow (Diamond, Logan and Mistake Creek catchments)**

| Waterway/Catchment | Estimated Mean Daily Flow – Yearly (cubic metres per second) |
|---|---|
| **Diamond Creek** | 2.4 |
| **Logan Creek** | 2.7 |
| **Mistake Creek** | 3.7 |

# 4. Legislation

## *4.1. Water Act 2000*

The *Water Act 2000* seeks the sustainable management of Queensland's water resources. All rights to the use, flow and control of all water in Queensland are vested in the State. The purpose of this Act is to advance sustainable management and efficient use of water and other resources by establishing a system for water planning, allocation and use.

Section 203 of the Act deals with Water Licences and Permits. The chief executive administering the Act may grant water licences for taking water or water permits for taking water. Typically, water permits are used for more temporary activities such as construction activities or testing, which have a reasonably foreseeable conclusion date.

The *Water Act 2000* is administered by the Department of Natural Resources and Mines. The criteria to be considered by the Department in considering whether to grant approval for works includes

- the application and additional information given in relation to the application;
- any water resource plan or resource operations plan that may apply to the permit;
- existing water entitlements and authorisations to take or interfere with water;
- any information about the impacts on natural ecosystems;
- any information about the impacts on the physical integrity of watercourses, lakes, springs or aquifers;
- policies developed in consultation with local communities for the sustainable management of local water; and
- the public interest.

In addition to the Water Act, each water area has its own Water Resource Plan (WRP). The rail line is located within the Water Resource (Burdekin Basin) Plan - (*Water Act 2000*).

## 4.2. Site Relevance

### 4.2.1 Water Permit

A water permit is required to take water under the *Water Act 2000.* The permit is applied for under any relevant WRP and provides the entitlement to take the water and the allocation (volume of water applied for). Water permits rather than water licences are usually issued where water is required for temporary uses that have a foreseeable conclusion date. In this instance, the water is required for construction purposes which have a foreseeable conclusion date.

Water permit applications for the extraction of water from watercourses need to include the following information:

- Purpose for which the water is to be used;
- Date of activity commencement and completion;
- Source;
- Name of the watercourse;
- Location (lot on plan);
- Maximum rate at which water will be extracted;
- Volume required (ML/day);
- Total volume required (ML over life of permit); and
- A map of the proposed extraction point.

### 4.2.2 Water Resource Planning

Mistake Creek is located within the *Water Resource (Burdekin Basin) Plan 2007 (*Burdekin Basin WRP) and is not within any of the Water Management Areas (WMAs) identified within the WRP. The Burdekin Resource Operations Plan 2009 (ROP) implements provisions of the WRP.

There is currently no regulation of the Belyando/Suttor Surface Water Management Area (SWMA) under the WRP. The Water Resource Plan focuses on water extraction for the irrigated farmlands in the lower Burdekin and Houghton River sub-catchments. Chapter 2 of the ROP outlines the process for making available and dealing with unallocated water mentioned in section 29 of the WRP.

The following unallocated water reserves are identified within the ROP:

(a) general reserve;

(b) strategic reserve; and

(c) SunWater reserve.

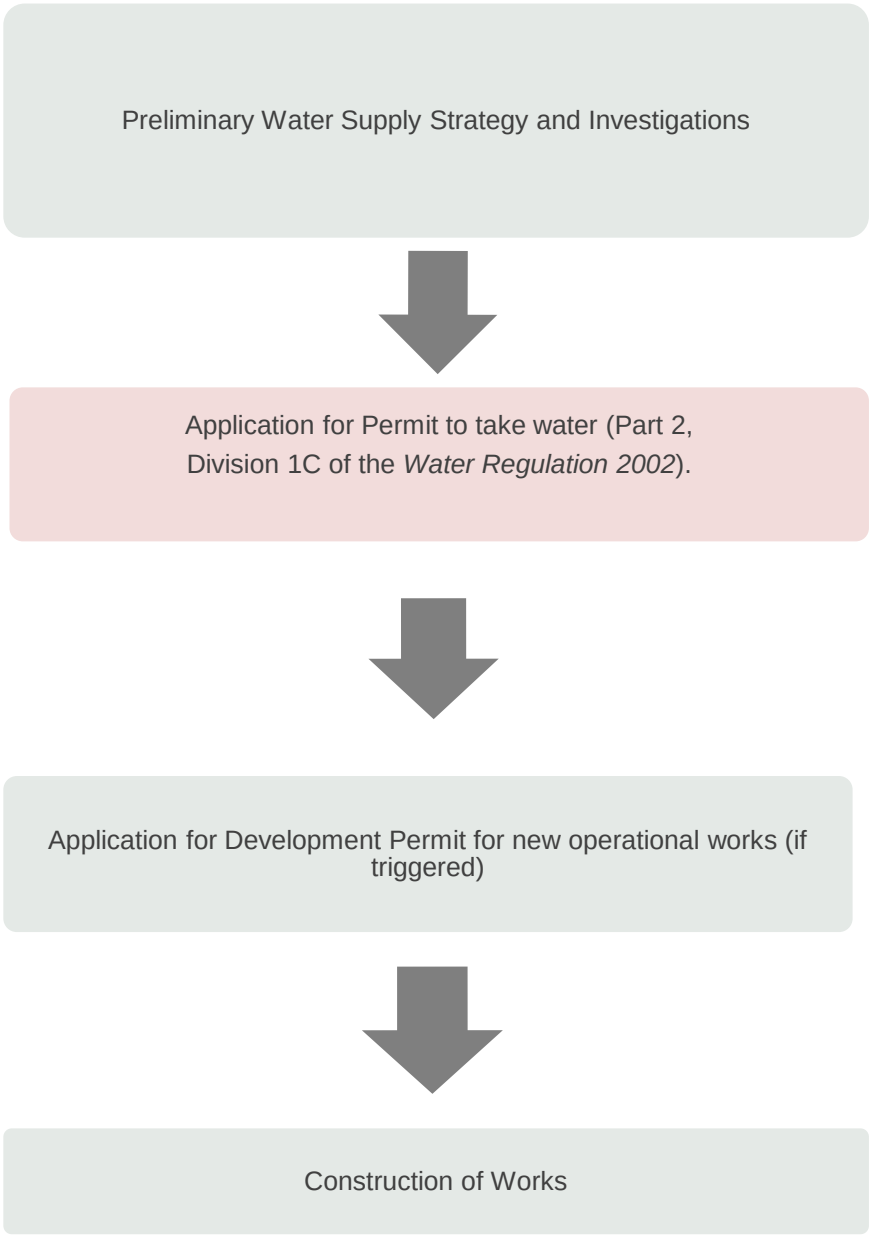
The ROP states that the time of production of the plan, there was 130,000ML of water in the 'general reserve' within sub-catchment E (Belyando and Suttor), within which SP1 of the rail alignment is located. The process identified for obtaining a permit to take unallocated water within the ROP area is the process prescribed in Part 2, Division 1C of the *Water Regulation 2002*.

### 4.2.3 Development Approval

Development approval(s) will also be required under the Sustainable Planning Act where such works are 'assessable development'.

> *Operational work (other than work carried out in a priority development area or on premises to which structure plan arrangements apply) that involves—*
>
> *(a) taking or interfering with water from a watercourse, lake or spring (other than under the Water Act 2000, section 20(2), (3) or (5)) or from a dam constructed on a watercourse or lake if it is not self-assessable development under part 2.*

**Figure 2: Permit Process (surface water extraction)**



# 5. Proposed Works

Proposed works include the taking of surface water from Mistake Creek for industrial purposes being the construction of the Carmichael Coal Rail Project – SP1 alignment. The proposed taking of surface water from Mistake Creek is summarised within *Table 4 – Summary of Proposed Water Extraction (Mistake Creek)*.

## 5.1. Taking Water from Mistake Creek

### 5.1.1 Required Water and Timeframe

It is proposed that a floating pump be used to directly extract water from Mistake Creek at a maximum rate of 25 litres per second.

A maximum volume of 2.16ML per day is required from Mistake Creek during the construction phase of the project. The construction phase is currently scheduled for October 2014 to May 2015, however in order to cater for potential delays in construction it is proposed that the permit timeframe be extended to two years (October 2014 to October 2016).

Over the construction timeframe, it is proposed that a total of 700ML of water be taken from Mistake Creek to be used primarily at supply points along the rail alignment. The water would be used for a variety of purposes including construction camp water, concrete batching and earthworks.

**Table 4: Summary of Proposed Water Extraction (Mistake Creek)**

| Waterway | Water Required (ML per day) | Total Water Required (ML) per year | Total Water Required | Location of use (SP1 rail alignment) |
|---|---|---|---|---|
| **Mistake Creek** | 2.16 | 350 | 700 | Lot 662PH1491<br>Lot 3 BL26<br>Lot 637 PH1980<br>Lot 4 SP116046<br>Lot 10 BL49<br>Lot 1SP118814<br>Lot 6 on SP125740 |

### 5.1.4 Location

It is proposed that water be taken directly from Mistake Creek at a location just upstream of the Disney gravity diversion. A recent site visit confirmed that the location can be easily accessed by vehicles and includes a clearing which would be suitable for installation of any ancillary works and/or equipment. Please refer to photographs 1-4 below which show the proposed location for water extraction from Mistake Creek, adjacent to the 'Disney' gravity diversion inlet.

**Photograph 1 – Mistake Creek adjacent to the gravity diversion inlet (viewing south)**

**Photograph 2 – Mistake Creek adjacent to the gravity diversion inlet (viewing west)**

**Photograph 3 – Bank of Mistake Creek adjacent to the gravity diversion inlet (viewing south-west)**

**Photograph 4 – Bank of Mistake Creek adjacent to the gravity diversion inlet (viewing west)**

**Photograph 5 – Bank of Mistake Creek adjacent to the gravity diversion inlet (viewing north)**

### 5.1.4 Water Storage

It is proposed that the water pumped from Mistake Creek be stored within an existing ring tank located on the 'Disney' property – Lot 4 on SP116046. The approximate size of the ring tank is 900m x 700m and is estimated to be approximately 5 metres deep. No modifications are proposed to the existing ring tank and with an estimated volume of 2.5-3.0GL, it is expected that the ring tank has more than sufficient capacity to contain an additional 350ML per year over the course of the permit period.

The lessee's of the 'Disney' property have provided consent to the making of the application for water permit and the arrangements with regard to the utilisation of the ring tank for construction water storage will be negotiated directly with the lessee.

Photographs 6-9 below show the existing 'Disney' ring tank.

**Photograph 6 – Aerial photograph of 'Disney' ring tank (courtesy Department of Natural Resources and Mines)**

**Photograph 7 – Southern wall of 'Disney' ring tank looking north**


**Photograph 8 – South-east corner of 'Disney' ring tank looking west**

**Photograph 9 – South-west corner of 'Disney' ring tank looking north-east**

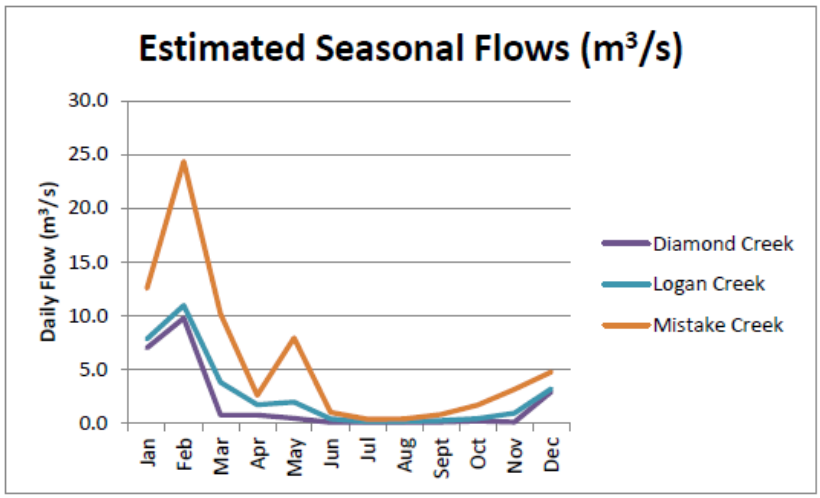
# 6. Assessment – Effects on Surface Water Resources

## 6.1. Mistake Creek Flow Analysis

In order to estimate the flows at Mistake Creek, Hyder used data from a Department of Natural Resources and Mines (DNRM) and Department of Energy and Water Supply (DEWS) gauging station located on Mistake Creek approximately 7km upstream of the proposed railway. Given that there are no inlet waterways between the gauging station and the railway, the historical flow data at this gauging station was deemed sufficient for determining flows at the railway crossing.

*Figure 3 – Estimated Seasonal Flows* shows the estimated flows in cubic metres per second for each of the three catchments. Both were derived from the Hyder Report.

**Figure 3 – Estimated Seasonal Flows (Hyder Report)**




The mean daily flow through Mistake Creek is 319.68 ML per day (3700l/s). During the drier months, in-flows can drop to 8.64ML per day (100l/s), however during the wetter months inflows can exceed 2160ML per day, therefore there is a significant supply of water during the wetter months, which may also coincide with flood events.

*Figure 4 – Estimated Mean Daily Flow (Mistake Creek)* summarises the mean daily flows through Mistake Creek each month.

**Figure 4 – Estimated Mean Daily Flow – Mistake Creek (Hyder Report)**

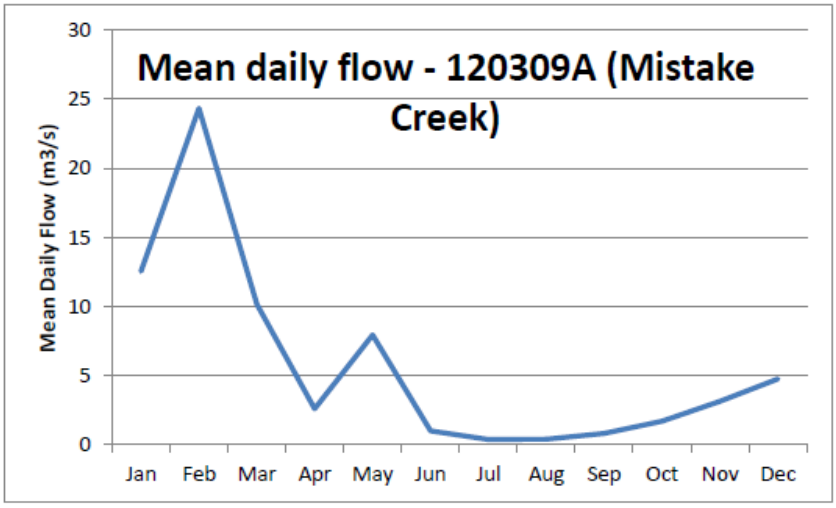



**Table 5 – Estimated Daily Flows by Month - cubic metres per second (Hyder Report)**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Diamond Creek** | 7.0 | 9.8 | 0.7 | 0.7 | 0.4 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 2.9 |
| **Logan Creek** | 7.8 | 10.9 | 3.8 | 1.7 | 2.0 | 0.4 | 0.1 | 0.2 | 0.2 | 0.4 | 0.9 | 3.2 |
| **Mistake Creek** | 12.5 | 24.4 | 10.2 | 2.6 | 7.9 | 1.0 | 0.4 | 0.4 | 0.8 | 1.7 | 3.1 | 4.7 |

### 6.1.1 Reliability

The results of the flow analysis indicated that a reliable water supply from Logan Creek or Diamond Creek cannot be assured during the months of June to November. Flows into Mistake Creek are more reliable through the months of October through to May. During wetter periods, water is available with daily flows ranging from 5 cubic metres per second to 24.4 cubic metres per second. Mistake Creek achieves a mean daily flow of 5 cubic metres per second in January, February, March and May. *Table 6 – Wet Days per Month for Mistake Creek* below summarises wet days per month and reliability of flows for Mistake Creek for the months of December through to March.

Estimated reliability for Mistake Creek indicates that during the wetter months, there are generally 13-18 'wet days' per month where the daily flow exceeds 5 cubic metres per second. The most reliable month for daily flows to exceed 5 cubic metres per second is February.

Flows through Mistake Creek exceed 1000 litres per second during all months except July, August and September.

**Table 6 – Wet Days per Month for Mistake Creek (Hyder Report)**

| Month | Wet Days (daily flow exceeds 5 cubic metres per second) | Reliability (daily flow exceeds 5 cubic metres per second) |
|---|---|---|
| **December** | 13.0 | 42% |
| **January** | 17.6 | 57% |
| **February** | 17.2 | 61% |
| **March** | 18.3 | 59% |

## 6.2. Major Water Users- Mistake Creek

Approximately 4km north of the rail alignment is a large offline water storage incorporating gravity diversion from Mistake Creek. The landholder of the property known as 'Disney' (PJ, MA & TJ Kirkwood) appears to have two water licences to take water from Mistake Creek for water harvesting:

- A licence for a gravity diversion (57847F) to take overland flow from Mistake Creek for agricultural/domestic purposes when the height of Mistake creek reaches a certain level (exceeding crest level of 194.67m) – the water then flows into the gravity diversion; and
- A second licence is for taking water from the gravity diversion (057819F) into the ring tank via six pumps at a maximum rate of 6500 litres per second. The take of water from the gravity diversion is only possible when the flow of Mistake Creek *downstream* of the gravity diversion is more than 5 cubic metres per second (equivalent to a sill height of 193.74 metres)

The following photographs 10-12 show the gravity diversion and pumping station associated with these licences.

**Photograph 10 – Existing diesel pumps within gravity diversion (ring tank in background)**

**Photograph 11 – Gravity Diversion from Mistake Creek looking east towards pumping station**

**Photograph 12 – Gravity diversion at pumping station looking west towards Mistake Creek**


According to the flow data for Mistake Creek, it is likely that the flows within the creek would exceed the sill height and minimum flow rate downstream of the gravity diversion during (3) months of the year – January, February and March. These periods would most likely coincide with monsoonal rains and flood conditions and thus the harvesting of water under these licences would only occur during the limited wet periods.

The proposed extraction of a maximum 25 litres per second upstream of the gravity diversion represents approximately 0.5% of the 5 cubic litres per second flowing through Mistake Creek while the above licences are operational (i.e. water harvesting taking place). It would represent approximately 0.21% of the total water flowing through Mistake Creek during these periods.

For the rate of extraction proposed and the total volumes proposed to be taken, Mistake Creek is therefore considered to be a reasonably reliable source of water for the construction phase of the project. The proposed extraction, if managed appropriately, should not significantly impact the water levels within Mistake Creek or impact significantly on the harvesting undertaken in accordance with the abovementioned licences.

## 6.3. Other Users

The Project (Rail) Hydrology Report (Appendix AB Rail Hydrology Report) discusses the potential impacts of the construction and operation of the rail in terms of adverse effects on the nominated surface water environmental values, predominantly around stock watering and farm use. This

assessment takes into consideration catchments, beds, banks and water columns associated with all waterways crossed by the Project (Rail).

The Project (Rail) Hydrology Report states that it is not expected that the construction phase of the Project (Rail) will adversely impact on water quantity associated with stock watering and farm use

It has been identified as part of the EIS documentation (Appendix AB – Rail Hydrology Report GHD 2012) that the majority of agricultural operations extract surplus water on an ad-hoc basis during the wetter months and that the majority of this water is taken from the Mistake Creek catchment – the largest catchment feeding into the Belyando.

The existing gauging station on Mistake Creek is situated approximately 7km upstream of the proposed SP1 rail alignment and approximately 11km upstream of the Disney offline storage. We are not aware of any licences to take water between the gauging station and the Disney offline storage. Measurements contained within the Hyder Report and relied upon as part of this report are anticipated to be accurate and the proposed water extraction should not significantly impact other users within the Mistake Creek catchment.

## 6.4. Environmental Effects

The Water Resource (Burdekin Basin) Plan 2007 lists the following ecological outcomes for the sustainable management of water within the plan area:

*(a) to maintain the natural variability of flows that support the habitats of native plants and animals and migratory birds in watercourses, floodplains, wetlands, lakes and springs;*

*(b) to provide for the continued capability of one part of a river system to be connected to another,*

*including by maintaining flood flows that—*

*(i) allow for the movement of native aquatic fauna between riverine, floodplain, wetland,*

*estuarine and marine environments; and*

*(ii) deliver nutrients and organic matter throughout the plan area to support natural processes such as breeding, growth and migration in riverine, floodplain, wetland, estuarine and marine environments; and*

*(iii) deliver water and sediments throughout the plan area to support river-forming processes;*

*(c) to minimise changes to natural variability in water levels and to support natural ecological*

*processes, including maintaining refugia associated with waterholes and lakes particularly in the Belyando-Suttor sub-catchment;*

*(d) to promote improved understanding of the matters affecting the flow-related health of ecosystems in the plan area;*

*(e) to maintain flooding in the Lower Burdekin and Haughton sub-catchments to provide freshwater inputs to wetlands on the Burdekin Haughton floodplain;*

*(f) to provide a flow regime that—*

*(i) maintains delivery of fresh water to the estuaries of watercourses and the Great Barrier Reef Lagoon; and*

*(ii) maintains natural sedimentation processes to support the replenishment of beaches along the Burdekin Haughton floodplain and Cape Bowling Green; and*

*(iii) supports productivity in the receiving waters of the Great Barrier Reef and inshore reefs.*

According to the EIS, Chapter 6, Volume 3 (GHD 2012), the aquatic ecosystem values of parts of the Belyando/Suttor Rivers sub-catchment are considered to be Slightly to Moderately disturbed (SMD) as a result of cattle grazing. The vegetation assessment shows that approximately 50% of the entire Belyando River/Suttor River catchment areas had less than 50% ground cover.

The potential impacts of the proposed water extraction will therefore be mainly related to environmental purposes and ensuring there is a sufficient flow of water through Mistake Creek during periods of low flow. As can be seen from the above analysis of the Mistake Creek flows, the difference in flows throughout the year is significant. During flood conditions, flows can exceed 24,400 litres per second whereas during the drier periods, flows may reduce to as little as 100 litres per second.

The proposed extraction of water from Mistake Creek at a maximum rate of 25 litres per second would, for most months of the year, represent an extremely low percentage of total flows through this portion of Mistake Creek. Refer to *Table 7- Comparison of mean daily flows* below which shows the average flows per month compared with the percentage water proposed to be taken during these periods.

**Table 7 – Comparison of mean daily flows and percentage of water taken per second**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mistake Creek flow per day (cubic metres per second)** | 12.5 | 24.4 | 10.2 | 2.6 | 7.9 | 1.0 | 0.4 | 0.4 | 0.8 | 1.7 | 3.1 | 4.7 |
| **% Water taken per second** | 0.2 | 0.1 | 0.25 | 0.96 | 0.32 | 2.5 | 6.25 | 6.25 | 3.13 | 1.5 | 0.8 | 0.57 |

## 6.5. Fish species

Desktop investigations within the project EIS found 51 and 47 fish species known to occur within the Burdekin and Fitzroy Basins, respectively. Forty of the identified species are common to both catchments. For details see project EIS section 2.6.2.3 page 2-97. Based on distributions, 17 of the freshwater fish species known from the Burdekin and Fitzroy Basins have the potential to occur in waterways intersected by, or of relevance to, the Study Area. None of these species are listed under the *Environmental Protection and Biodiversity Conservation (*E*PBC) Act* or Nature Conservation Acts.

Field investigations within the project EIS at the nearby mine site recorded 11 of the species known to occur. All are common freshwater species which have been previously recorded in the upper Burdekin Catchment.

All 17 fish species with the potential to occur in the study area are potamodromous and so do not require passage beyond their freshwater habitat for migratory purposes. Maximum dispersal rates for most of these species are likely to occur following flood peak as waters recede.

The extraction of water from Mistake Creek should not significantly impact fish species currently inhabiting the waterways and should not cause any impact to species listed under the *Environmental Protection and Biodiversity Conservation (EPBC) Act* or *Nature Conservation Act 1992*.

**Table 8: Fish species recorded at and potentially inhabiting waterways in the study site**

| Status* | Scientific name | Family | Common name | Size† | Habitat§ |
|---|---|---|---|---|---|
| Present | *Craterocephalus stercusmuscarum* | Atherinidae | Fly-specked hardyhead | S | All |
| | *Ambassis agassizii* | Chandidae | Agassiz's glassfish | S | All |
| | *Hypseleotris* sp. | Eloteridae | Midgley's carp gudgeon | S | All |
| | *Mogurnda adspersa* | | Southern Purple-spotted gudgeon | M | All |
| | *Oxyeleotris lineolata* | | Sleepy cod | L | Slow |
| | *Melanotaenia splendida splendida* | Melanotaeniidae | Eastern rainbowfish | M | All |
| | *Neosilurus hyrtlii* | Plotosidae | Hyrtl's tandan | L | All |
| | *Leiopotherapon unicolor* | Terapontidae | Spangled perch | L | All |
| Possible | *Nematalosa erebi* | Clupeidae | Bony bream | M | All |
| | *Hypseleotris klunzingeri* | Eloteridae | Western carp gudgeon | S | All |
| | *Philypnodon grandiceps* | | Flathead gudgeon | S | Slow |
| | *Macquaria ambigua* | Percichthyidae | Golden perch | L | Slow |
| | *Neosilurus ater* | Plotosidae | Black catfish | L | Fast |
| | *Neosilurus mollespiculum* | | Soft-spined catfish | M | Slow |
| | *Porochilus rendahli* | | Rendahl's catfish | M | Slow |
| | *Scortum parviceps* | Terapontidae | Small-headed grunter | L | Fast |
| | *Toxotes chatareus* | Toxotidae | Seven-spotted archerfish | L | Slow |

*Present = recorded as present at either the mine or rail site within the project EKS, Possible = project EIS desktop search predicted

†Size as adult, S = small (<10cm), M = medium (10-20cm), L = large (>20cm)

§Slow = relatively still and slow waters, Fast = relatively swift moving water