Northern Pipeline Interconnector 2 (NPI2)

Annual Compliance Report 2023 - 2024

Revision 1 | April 2024

seqwater
WATER FOR LIFE

Distribution list

Name	Date Issued
Department of Climate Change, Energy, the Environment and Water (DCCEEW)	26/04/2024

Document control

Reviewer		
Date	**Name**	**Position**
13/03/2024	Kate Buckley	Environmental Officer
19/04/2024	Ashleigh Muir	Senior Environmental Advisor

Approved for issue		
Date	**Name**	**Position**
23/04/2024	Eddie Eugster	Principal Environment

Contents

Executive Summary

This annual compliance report marks the 14th assessment of Matters of National Environmental Significance (MNES) for the Northern Pipeline Interconnector Stage 2 (NPI2) and addresses the conditions mandated under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). It covers compliance with the conditions of approval from February 15, 2023, to February 15, 2024.

With the NPI2 project transitioning from construction and commissioning to operational phases, several conditions have been closed out while others remain active. During this reporting period (2023–2024), 12 conditions were active, with three remaining inactive (EPBC 13, 14, and 17).

The active conditions during this period have been assessed for compliance, summarised in **Table 1**, and detailed descriptions are provided in **Sections 2.1 – 2.13**. The compliance assessment reveals no significant impact on EPBC Act listed species and no incidents necessitating notification to DCCEEW occurred during this reporting period. All ongoing active EPBC conditions of approval will continue to be implemented during the operational phases of the NPI2.

1. Introduction

The Northern Pipeline Interconnector Stage 2 (NPI2) project was classified as a controlled action under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). This controlled action was evaluated under the Bilateral Agreement and received approval, subject to conditions, on 12/02/10 (EPBC 2007/3686) by the Minister for the Department of Climate Change, Energy, the Environment and Water (DCCEEW), formerly known as the Department of the Environment, Water, Heritage, and the Arts (DEWHA).

This document serves as the 14th annual compliance report and addresses the requirements of ongoing conditions applied to the NPI2 project during the twelve months spanning from 15/02/23 – 15/02/24.

Initially, the Southern Regional Water Pipeline Company Pty Ltd (trading as LinkWater Projects) was the proponent of this controlled action. LinkWater Projects was established as the Queensland Government's dedicated entity for the design and implementation of bulk water pipelines and associated infrastructure in South East Queensland. However, on 30/06/12, as part of the Queensland Government's water sector reform, LinkWater Projects ceased operations, transferring its functions to the Queensland Bulk Water Transport Authority (trading as LinkWater). LinkWater assumed operational control over ongoing and future projects previously managed by LinkWater Projects. Upon the completion of construction and commissioning activities in July 2012, the NPI2 project infrastructure was transitioned to LinkWater for operation and maintenance.

Subsequently, on 01/01/13, as part of further Queensland Government water sector reforms, the Queensland Bulk Water Supply Authority (trading as Seqwater) merged with LinkWater and the SEQ Water Grid Manager. Retaining the trading name Seqwater, it became the primary statutory authority responsible for ensuring a safe, secure, and reliable water supply across South East Queensland (SEQ). Consequently, Seqwater assumed ownership and operational responsibility for the NPI2. With the consolidation of functions and powers from LinkWater, Seqwater is now recognised as the proponent of the NPI2 and all associated statutory approvals.

1.1. NPI2 Project Overview

The NPI2 is an integral component of the SEQ Water Grid, facilitating the transmission of up to 65 Megalitres (ML) per day of treated potable water between reservoirs in the Sunshine Coast and the Brisbane metropolitan area. This infrastructure plays a crucial role in ensuring a dependable water supply for SEQ, contributing to the long-term water security of the region.

As detailed in the NPI2 Environmental Impact Statement (EIS), the project establishes a connection between the Noosa Water Treatment Plant (WTP) and the northern end of the previously completed Stage 1 pipeline at Eudlo. The construction involved approximately 44km of mainline pipeline and 4.3km for the Noosa branch main. Designed for bi-directional flow, the NPI Stages 1 and 2 facilitate the transfer of potable water in both southern and northern directions between the North Pine WTP and Noosa WTP.

NPI2 was delivered by the Northern Network Alliance (NNA), comprising KBR, Abigroup, McConnell Dowell, and LinkWater Projects as the owner-participant. Upon construction completion, ownership of NPI2 transferred to LinkWater on 30/06/12 and subsequently to Seqwater following the merger involving LinkWater, the SEQ Water Grid Manager, and Seqwater on 01/01/13.

1.2. NPI2 Project Progress

The NPI2 project milestones completed to date include:

- Construction commenced on the NPI2 project on 15/02/10.
- Construction was completed on 17/11/11.
- Commissioning works were finalised, and the NPI2 was transferred to LinkWater in 2012.
- The operational phase of the NPI2 commenced on 08/07/12 and remains ongoing.

2. Conditions of Compliance

To demonstrate compliance with the EPBC Act approval conditions, **Table 1** outlines each condition number as specified in the controlled action approval notice dated 12/02/10. Conditions marked as inactive have not been addressed in this report. A summary of the status and compliance assessment of the active approval conditions is provided in Column 3 and Column 4 of **Table 1**. Please note that some conditions in **Table 1** are presented as lettered bullet points for ease of reference, and the visual presentation may vary from the determination notice.

Table 1. Summary of EPBC Act Controlled Actions Conditions and Compliance for NPI2, Feb 2023 – Feb 2024

EPBC Condition Number & Requirements	Compliance
EPBC 1	
The person taking the action must undertake the action in accordance with the conditions of this approval and, to the extent that it relates to protection of EPBC Act listed threatened species and communities and EPBC Act listed migratory species, as described in the EIS. Where the EIS and these conditions are contradictory, these conditions will prevail to the extent of the contradiction. **Status:** General Obligation	☒ **Compliant** ☐ Non-compliant
EPBC 2	
Conditions 24 to 32 of the Queensland Coordinator General's (CG) Report are hereby incorporated into these conditions of approval. Subject to Condition 3, the person taking the action must comply with Conditions 24 to 32 of the CG's Report. **Status:** Conditions 24, 25, 26, 27, 29, 30 and 31 have been closed, 28 and 32 remain active.	☒ **Compliant** ☐ Non-compliant
Coordinator General 28	
LinkWater Projects is to develop a riparian monitoring program for the construction and operational phases of the project as detailed in the EIS. The monitoring program is to: a. *establish performance indicators within the EMPs against which environmental performance is measured/assessed* b. *provide credible mechanisms (e.g., response levels) that trigger modification of mitigation measures or suspension of project-related activities (including altering the volume and timing of abstraction of water from the Mary River under existing allocations)* c. *assist in the continuous improvement of the project's environmental management* d. *provide sufficient data for analyses and discussion – to be presented in regular reports* e. *provide additional information on local distribution, abundance and/or condition of protected species and important habitats and to inform species' databases kept by the Queensland Herbarium, the Queensland Museum and the DERM.* **Status:** Construction phase: Closed during the 2011-12 reporting period. Operational phase: Closed post-November 2015. Riparian Habitat Monitoring Program (RHMP): The RHMP was submitted to DCCEEW for ministerial approval on 15/05/14 and received approval via letter on 12/08/14. Closed in accordance with RHMP Section 6.1. The OEMP remains active following its approval by DCCEEW on 12/08/14.	☒ **Compliant** ☐ Non-compliant

Coordinator General 32

LinkWater Projects is to develop an aquatic habitat monitoring program (AHMP) for the construction and operational phases of the project as detailed in the EIS. The program is to monitor aquatic (instream) habitat features for the Mary River Turtle, Mary River Cod and the Australian Lungfish in the Mary River (downstream of the Coles Crossing offtake) and in Six Mile Creek. The monitoring program is to:

a. *establish performance indicators within the EMPs against which environmental performance is measured/assessed*
b. *provide credible mechanisms (e.g., response levels) that trigger modification of mitigation measures or suspension of project-related activities (including altering the volume and timing of abstraction of water from the Mary River under existing allocations)*
c. *assist in the continuous improvement of the project's environmental management*
d. *provide sufficient data for analyses and discussion – to be presented in regular reports*
e. *provide additional information on local distribution, abundance and/or condition of protected species and important habitats and to inform species' databases kept by the Queensland Herbarium, the Queensland Museum and the DERM.*

Status: Construction phase: Closed during the 2011-12 reporting period. Operational phase: Ongoing. Refer to Section 2.4 for further details. The AHMP was submitted to DCCEEW for ministerial approval on 15/05/2014 and received approval via letter on 12/08/2014.

☒ **Compliant**
☐ Non-compliant

EPBC 3

For the purpose of this approval, Conditions 24 to 32 of the QCG's Report are subject to the following requirements:

a. *Condition 24 must include EPBC Act listed threatened species and communities and listed migratory species*
b. *the final version of the Sensitive Area Plans (SAP) imposed by Condition 24 must be submitted to the Department prior to the commencement of construction at any place where there are likely to be impacts on EPBC Act listed threatened species and/or communities and/or listed migratory species*
c. *in relation to Condition 26, the person taking the action must inform the Department at least 14 days prior to the commencement of the action of the preferred crossing method (including providing reasons for the selection)*
d. *the SAP's imposed by Conditions 26 and 27 must be provided to the Department at least 14 days prior to the commencement of construction of the waterway crossing(s). Construction of the waterway crossing(s) must not commence until the Minister has approved the SAP in writing*
e. *the SAP's referred to in Condition 3d must be implemented*
f. *the minutes required by Condition 27 must be provided to the Department at least 14 days prior to the commencement of construction of the waterway crossing(s)*
g. *details of the appropriate scheduling of the construction of the waterway crossings referred to in Part B of Condition 27 must be submitted to the Department at least 14 business days prior to the commencement of construction of the waterway crossing(s)*
h. *the riparian monitoring program imposed by Condition 28 must be submitted to the Department for the Minister's approval prior to the commencement of any construction that may result in impacts on any riparian vegetation community on the site of the action. Construction that may result in impacts on any riparian vegetation community on the site of the action must not commence until the Minister has approved the riparian monitoring program in writing. The approved program must be implemented*
i. *the detailed surveys required by Condition 31 must be submitted to the Department at least 14 business days prior to the commencement of any construction at or in reasonable proximity to the proposed waterway crossings of Six Mile Creek*
j. *the aquatic habitat monitoring program imposed by Condition 32 must be submitted to the Department for the Minister's approval prior to the commencement of any construction that may result in impacts on any aquatic area on the site of the action. Construction that may result in impacts on any aquatic area on the site of the proposed action must not commence until the Minister has approved the aquatic habitat monitoring program in writing. The approved program must be implemented.*

Status: Items 3(a)– (g) and (i): Closed during the 2011-12 reporting period. Items 3(h) and (j) remain ongoing for the operational phase. Item 3(h) has been successfully addressed in accordance with RHMP Section 6.1 and the NPI2 OEMP, which was approved by DCCEEW on 12/08/14.

☒ **Compliant**
☐ Non-compliant

EPBC 4

Within 3 months from the date of this approval the person taking the action must submit to the Minister for approval an EMP. The EMP must include, but not be limited to, procedures for:

☒ **Compliant**
☐ Non-compliant

a. *minimising impacts on all EPBC Act listed threatened species and communities and listed migratory species on the pipeline route, including, but not limited to, all waterway crossings* b. *post construction revegetation of disturbed areas to minimise ongoing erosion* c. *the obtaining and keeping of accurate data that measures and records on both a daily and yearly basis the:* i. *amount of water extracted from Coles Crossing offtake* ii. *flow volume and levels at both Coles Crossing pump station and Home Park gauging station* iii. *amount of water transported through the NPI2.* **Status:** Items 4(a) and (b) were closed during the 2011-12 reporting period. Item 4(c) remains ongoing for the operational phase. An updated OEMP was submitted to DCCEEW on 15/05/2014 for ministerial approval and received approval via letter on 12/08/14.	
EPBC 5	
The data obtained and kept by the person taking the action in accordance with Condition 4.c must be submitted to the Department within three months of every 12 month anniversary of the commencement of the action. **Status:** Ongoing	☒ **Compliant** ☐ Non-compliant
EPBC 7	
If the person taking the action wishes to carry out any activity otherwise than in accordance with these conditions, the person taking the action must immediately submit for the Minister's written approval a revised version of any such plan/program. If the Minister approved any such revised plan/program, that plan/program must be implemented in place of the plan/program originally approved. **Status:** Ongoing	☒ **Compliant** ☐ Non-compliant
EPBC 9	
Should water be required to be extracted from the Coles Crossing offtake pursuant to the action, the person taking the action must transport water strictly in order of the following preferences: a. *1st preference - (run of river) water harvested from the Mary River main channel at the Coles Crossing offtake when flow at the pump station is at or above 90 ML/day and flow at Home Park gauging station is at above 20 ML/day; or otherwise* b. *2nd preference - (controlled release from Borumba Dam) taking high priority allocation released made from existing allocations from Borumba Dam (at the Coles Crossing offtake) of no more than 20 ML/day up to a total of 6500 ML/annum, when flow at the pump station is below 90 ML/day and flow at Home Park gauging station is below 20 ML/day* **Status:** Ongoing	☒ **Compliant** ☐ Non-compliant
EPBC 10	
Subject to Condition 9, the person taking the action must not transport more than 20 ML/day (or 6500 ML/annum) from Coles Crossing offtake for the southern transfer of water through the pipeline. **Status:** Ongoing	☒ **Compliant** ☐ Non-compliant
EPBC 11	
The person taking the action must comply with all relevant state water licenses, permits and authorities in relation to the construction and operation of the action. To the extent that any state water licence, permit or authority is, or becomes, inconsistent with these conditions, these conditions will prevail. **Status:** Ongoing	☒ **Compliant** ☐ Non-compliant
EPBC 12	
Within 3 months of every 12-month anniversary of the commencement of the action, the person taking the action must submit to the Department a report addressing compliance with each of the relevant state water licences, permits and authorities in relation to the construction and operation of the action, as referred to in Condition 11. **Status:** Ongoing	☒ **Compliant** ☐ Non-compliant
EPBC 13	
If the Minister believes that it is reasonably necessary or desirable for the better protection of listed threatened species and communities and/or listed migratory species to do so, the Minister may request that the person taking the action make specified revisions to the plans/programs referred to in these conditions and submit the revised plan/program for the Ministers approval. The person taking the action must comply with any such request. The revised approved plan/program must be implemented in place of the plan/program originally approved. **Status:** Ongoing	☒ **Compliant** ☐ Non-compliant

EPBC 14	
If, at any time after 5 years from the date of this approval, the Minister notifies the person taking the action in writing that the Minister is not satisfied that there has been substantial commencement of the works, the action must not thereafter be commenced without the written agreement of the Minister. **Status:** Ongoing	☒ **Compliant** ☐ Non-compliant
EPBC 15	
The person taking the action must maintain accurate records substantiating all activities associated with or relevant to these conditions of approval, including, but not limited to, measures taken to implement the management plans required by this approval (including the EMP), and make them available upon request to the Department. Such records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of the audits will be posted on the Department's website. The results of the audits may also be publicised through the general media. **Status:** Ongoing. An updated OEMP was submitted to DCCEEW on 15/05/2014 for ministerial approval and received approval via letter on 12/08/14.	☒ **Compliant** ☐ Non-compliant
EPBC 16	
Within 3 months of every 12-month anniversary of the commencement of the action, the person taking the action must submit to the Department a report addressing compliance (including demonstrating how compliance has been achieved) with each and every condition of this approval (including Conditions 24 to 32 of the QCG's Report) over the previous 12 months. Annual reports must be provided until the Minister is satisfied the proponent has complied with all conditions of the approval. **Status:** Ongoing	☒ **Compliant** ☐ Non-compliant
EPBC 17	
Upon the direction of the Minister, the person taking the action must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the Minister. The independent auditor must be approved by the Minister prior to the commencement of the audit. Audit criteria must be agreed to by the Minister and the audit report must address the criteria to the satisfaction of the Minister. **Status:** Ongoing. Not activated by the Minister.	☐ Compliant ☐ Non-compliant ☒ **N/A**

2.1. EPBC Condition 1

Compliance Assessment – Compliant

The requirements of EPBC Condition 1 are outlined in **Table 1**. Evidence of compliance with this condition has been submitted to DCCEEW in previous annual compliance reports. Activities associated with or relevant to the conditions of approval for EPBC Condition 1 remain compliant for the current reporting period (2023-24) with the exception of the Acoustic Doppler data gaps from Coles Crossing offtake (refer to **Section 2.5** for further details).

2.2. EPBC Condition 2

Compliance Assessment – Compliant

Compliance with the remaining active conditions (28 and 32) is outlined in **Sections 2.3 – 2.4** below.

2.3. Coordinator General Condition 28

Compliance Assessment – Compliant

While the operation of the NPI2 is not expected to impact riparian habitats or EPBC Act listed species using such habitats, Seqwater commissioned the development of an operational Riparian Habitat Monitoring Program (RHMP) to assess the existing condition of riparian habitat along the Mary River at the Coles Crossing offtake and to provide recommendations for future monitoring needs.

The operational RHMP development involved reviewing the construction based RHMP to identify past commitments and requirements. Key components of this review included documenting and analysing previously collected data, establishing performance criteria, defining mitigation measure response levels, identifying appropriate mitigation measures, and outlining riparian monitoring requirements. After an extensive review, it was concluded that the operation of NPI2 would not affect the riparian habitats at sites where the Giant Barred Frog has been observed, thereby having no impact on individual frogs. However, it was advised to continue monitoring the Giant Barred Frog and its habitat annually for two years (November 2014 and November 2015).

The Operational Environmental Management Plan (OEMP) was approved by DCCEEW in August 2014 and continues to be implemented throughout the current reporting period (2023–2024).

2.4. Coordinator General Condition 32

Compliance Assessment – Compliant

The development of the operational Aquatic Habitat Monitoring Plan (AHMP) involved a thorough review of the construction based AHMP to identify past commitments and requirements, which included:

- Conducting baseline ecological monitoring to establish performance indicators and response levels.
- Documenting and analysing baseline data.
- Establishing performance criteria and mitigation measure response levels.
- Identifying appropriate mitigation measures.
- Defining aquatic habitat monitoring requirements.

Based on the previously endorsed framework outlined in the AHMP (construction), the recommended ongoing monitoring program includes five of the nine sites assessed in the baseline survey. Additionally, a rationalised survey method was proposed compared to the initial approach. The recommended frequency of habitat monitoring is once each year, scheduled for October during low flow conditions. Annual assessments of aquatic habitat for the MNES species at the five designated sites provides data to evaluate the performance of this indicator in maintaining suitable aquatic habitat in the survey area. An overview of the AHMP report is provided in **Section 3**, with the complete report included as Appendix A.

A maximum extraction rate of 20 ML/day from the Coles Crossing offtake was recommended as a performance indicator for the operational phase of the NPI2. An assessment of potential impacts to MNES species conducted as part of the Environmental Impact Statement (EIS)[1] for the NPI2 Project found no significant change to the frequency or duration of flows predicted for seasonally high and low flow periods for the Mary River, based on extraction levels of up to 40 ML/day. However, the current infrastructure at the Coles Crossing pump station (referred to as the Coles Crossing offtake) is designed for a maximum extraction rate of only 20 ML/day, half of what was assessed in the EIS.

If there are ever plans to increase the water extraction rate beyond 20 ML/day through upgrading the pumping station infrastructure, the AHMP will need to be revised, acknowledging that additional environmental approvals may be required for such an upgrade. The construction phase was finalised during the reporting period of 2011-2012. The AHMP received approval from DCCEEW in August 2014. The operational phase is currently ongoing and compliant.

[1] Linkwater Projects, Northern Pipeline Interconnector – Stage 2 Environmental Impact Statement, December 2008

2.5. EPBC Condition 4(c)

Compliance Assessment – Compliant

EPBC Condition 4(c) remains ongoing for the operational phase. The subsequent **Sections 2.5.1 – 2.5.2** provide an overview of Seqwater's compliance status with Condition 4(c).

2.5.1. Water Extracted from Coles Crossing Pump Station (Condition 4(c)i)

Compliance Assessment – Compliant

EPBC Condition 4(c) necessitates the acquisition and maintenance of precise records including:

- *4(c)i – the amount of water extracted from Coles Crossing offtake.*

During this reporting period (2023 - 2024), a total of 3,595 ML of water was extracted from the Coles Crossing offtake, in line with the existing water extraction entitlement. This volume represents approximately 55.3% of the annual extraction entitlement, which is 6,500 ML. A summary of the monthly raw water extraction from the Coles Crossing offtake is outlined in **Table 2**. All records have been maintained and summarised in this report. Daily extraction volumes can be provided to DCCEEW upon request.

Table 2. Raw Water Extraction Volumes at Coles Crossing Offtake

Month	Extraction Volume (ML)	Percentage of Total Allocation (6500 ML/y)
February 2023*	84	1.3%
March 2023	181	2.8%
April 2023	348	5.4%
May 2023	411	6.3%
June 2023	163	2.5%
July 2023	155	2.4%
August 2023	416	6.4%
September 2023	371	5.7%
October 2023	329	5.1%
November 2023	347	5.3%
December 2023	403	6.2%
January 2024	299	4.6%
February 2024*	88	1.4%
TOTAL	**3,595**	**55.3%**

*Extraction volumes are calculated from 15 February 2023 to 15 February 2024 to align with the reporting period.

2.5.2. Flow Volumes and levels at Coles Crossing and Home Park (Condition 4(c)ii)

Compliance Assessment – Compliant

EPBC Condition 4(c) necessitates the acquisition and maintenance of precise records including:

- *4(c)ii – the flow volume and levels at both Coles Crossing pump station and Home Park gauging station.*

2.5.2.1. Water Levels at Coles Crossing Offtake

In accordance with Condition 4(c)ii, water levels must be obtained daily from both the Coles Crossing offtake and the Home Park gauging station at the Mary River. As outlined in the OEMP, water levels at Coles Crossing are recorded using an Acoustic Doppler (in-situ monitoring instrument). Water levels at Home Park (station number 138014A) are recorded on a daily basis by the Department of Regional Development, Manufacturing and Water (DRDMW), and all records are accessible to the public via the DRDMW water quality website.

As noted in the previous annual compliance report, Seqwater initiated a project to reinstate and relocate the Acoustic Doppler to a more suitable location after flooding impacts, aiming to enhance accessibility for data retrieval and instrument maintenance. The Doppler was successfully installed in December 2022 and commissioned in January 2023.

As depicted in **Table 3** and **Figure 1**, the Doppler data recorded during this reporting period exhibits significant data gaps. Although the Doppler has been successfully commissioned, it is not the preferred method of calculating volumes under low flow conditions. This is due to the wide and shallow stream profile with very low velocities and base flow, resulting in widely variable readings.

In lieu of the Doppler data, Seqwater's Hydrometric team recommended utilising discharge data, which is generated using the industry-standard method of employing survey data (e.g., cross-section, sensor levels, cease to flow, slope, etc.) along with real-time flow gauging's at various stages to establish a stage-to-discharge relationship specific to each site. Our data management system then utilises this rating to convert the stage data into flow data. Flow gauging's are consistently conducted at the site, and regular maintenance visits are undertaken to validate and calibrate the rating as required. This method is employed across majority of Seqwater's Hydrographic sites and is widely utilised at Hydrographic stations throughout Australia. While the OEMP specifies the use of an Acoustic Doppler for flow monitoring, the industry-standard method is deemed more reliable. This method enables the assessment of operations to achieve the monitoring program's intent and, consequently, the approval requirements. Daily water levels can be provided to DCCEEW upon request.

Table 3. Average Water Levels at Coles Crossing Offtake

Month	Average Daily Water Level at Coles Crossing Offtake (Doppler) (mAHD)	Average Daily Water Level at Coles Crossing Offtake (Gauge) (mAHD)
February 2023*	51.0	51.0
March 2023	50.9	50.9
April 2023	50.9	50.9
May 2023		50.9
June 2023		50.9
July 2023		50.9
August 2023		50.9
September 2023		50.9
October 2023		50.9
November 2023		50.9
December 2023	51.0	50.9
January 2024	51.6	51.7
February 2024*	51.5	51.5

*Water levels are calculated from 15 February 2023 to 15 February 2024 to align with the reporting period.

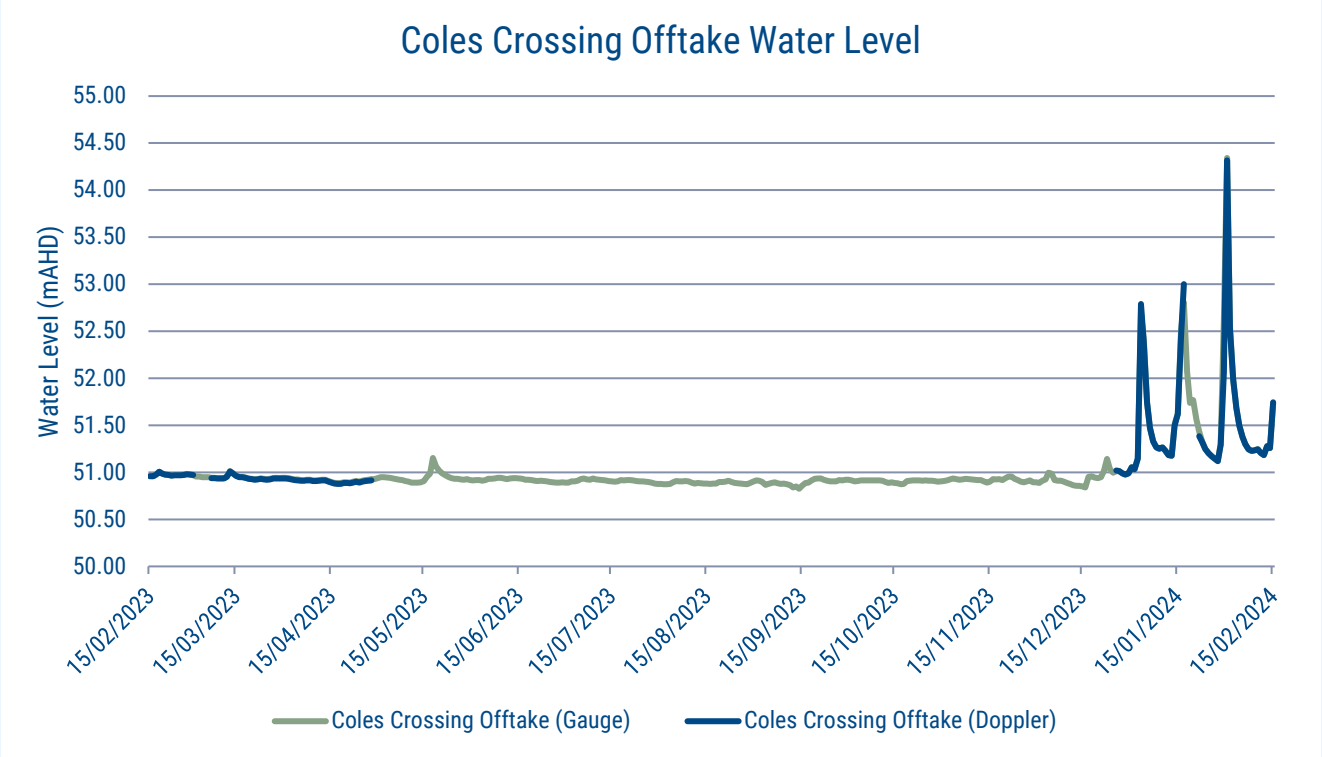


Figure 1. Average Water Levels at Coles Crossing Offtake

2.5.2.2. Flow Volume at Coles Crossing Offtake

In accordance with Condition 4(c)ii, flow volumes (volumetric flow rate) must be obtained daily from both the Coles Crossing offtake and the Home Park gauging station at the Mary River. As outlined in the OEMP, flow volumes at Coles Crossing are recorded using an Acoustic Doppler (in-situ monitoring instrument). Flow volumes at Home Park (station number 138014A) are recorded on a daily basis by DRDMW, and all records are accessible to the public via the DRDMW water quality website.

Similar to the water level data gaps detailed in **Section 2.5.2.1**, the Doppler flow volume data recorded during this reporting period also displays notable data gaps. Average flows recorded at the Coles Crossing offtake, utilising both the Doppler and the industry-standard discharge method discussed in **Section 2.5.2.1**, have been compiled in **Table 4** and visually represented in **Figure 2**.

As previously noted, although the OEMP specifies the use of an Acoustic Doppler for flow monitoring, the industry-standard method is deemed more reliable. This method enables the assessment of operations to achieve the monitoring program's intent and, consequently, the approval requirements. Daily flow volumes can be provided to DCCEEW upon request.

Table 4. Average Flow Volumes at Coles Crossing Offtake

Month	Average Daily Flows at Coles Crossing Offtake (Doppler) (m^3/s)	Average Daily Flows at Coles Crossing Offtake (Gauge) (m^3/s)	Average Daily Flows at Coles Crossing Offtake (Doppler) (ML/d)	Average Daily Flows at Coles Crossing Offtake (Gauge) (ML/d)
February 2023*	0.6	1.0	47.9	85.3
March 2023	0.4	0.8	34.5	70.1

April 2023	0.3	0.6	29.2	54.3
May 2023		0.8		71.6
June 2023		0.7		56.5
July 2023		0.6		52.2
August 2023		0.5		45.1
September 2023		0.5		46.9
October 2023		0.6		51.0
November 2023		0.7		56.9
December 2023	0.7	0.9	62.0	75.9
January 2024	15.9	17.8	1,170.9	1,533.7
February 2024*	8.5	10.3	736.1	890.1

*Flow volumes are calculated from 15 February 2023 to 15 February 2024 to align with the reporting period.

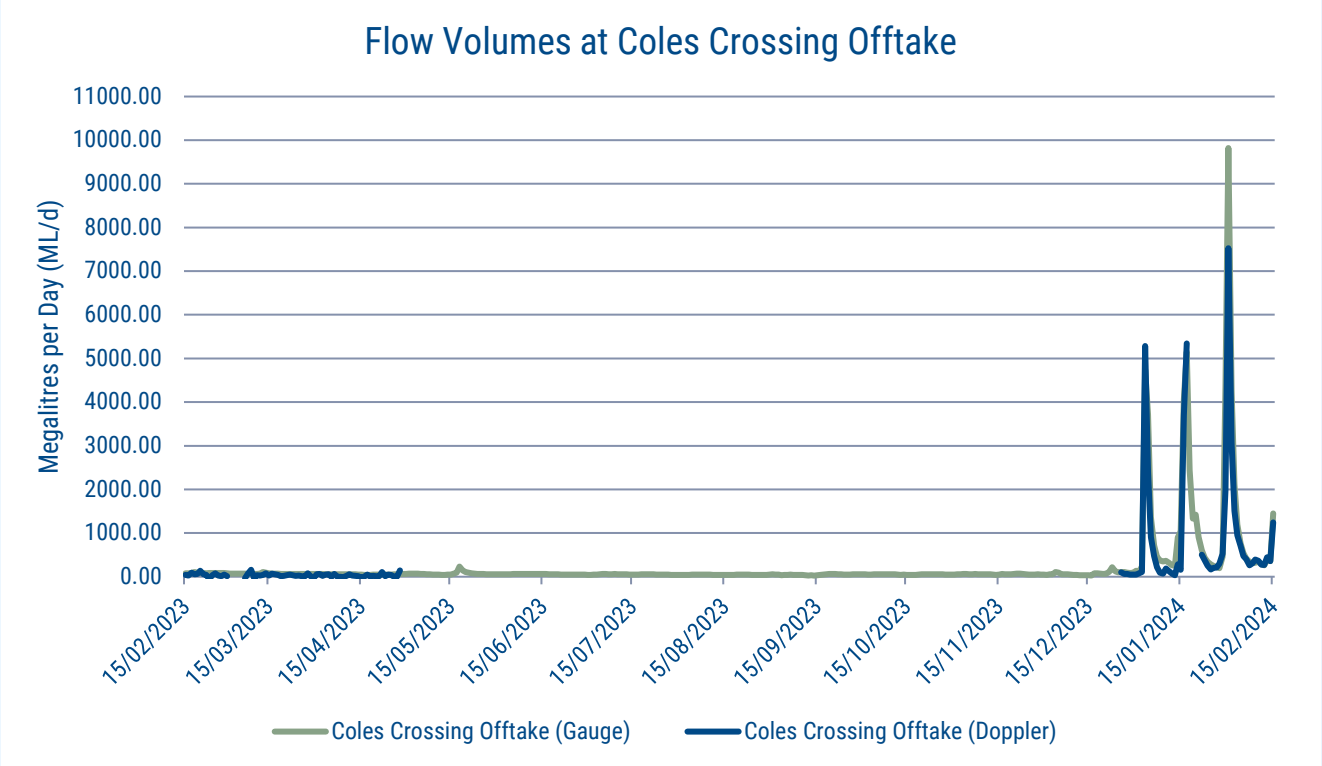


Figure 2. Average Flow Volumes at Coles Crossing Offtake

2.5.2.3. Water Level and Flow Volume at Mary River Home Park Gauging Station

Flow volumes (volumetric flow rate) and water levels at the Home Park gauging station (station number 138014A) are recorded daily by DRDMW. This data is accessible to the public on the DRDMW Water Monitoring Website. Average flows and river levels recorded at the Home Park gauging station have been compiled in **Table 5** and graphically depicted in **Figure 3**. Water levels and daily flow volumes can be provided to DCCEEW upon request.

Table 5. Average Flow Volumes and Water Level at Home Park Gauging Station

Month	Average Daily Flows at Home Park (ML/d)	Average River Level at Home Park (m)
February 2023*	535	1.58
March 2023	449	1.51
April 2023	133	1.30
May 2023	193	1.35
June 2023	157	1.33
July 2023	136	1.30
August 2023	59	1.21
September 2023	50	1.19
October 2023	29	1.15
November 2023	19	1.09
December 2023	568	1.47
January 2024	8,076	2.79
February 2024*	7,689	2.64

*Water levels and flow volumes are calculated from 15 February 2023 to 15 February 2024 to align with the reporting period.

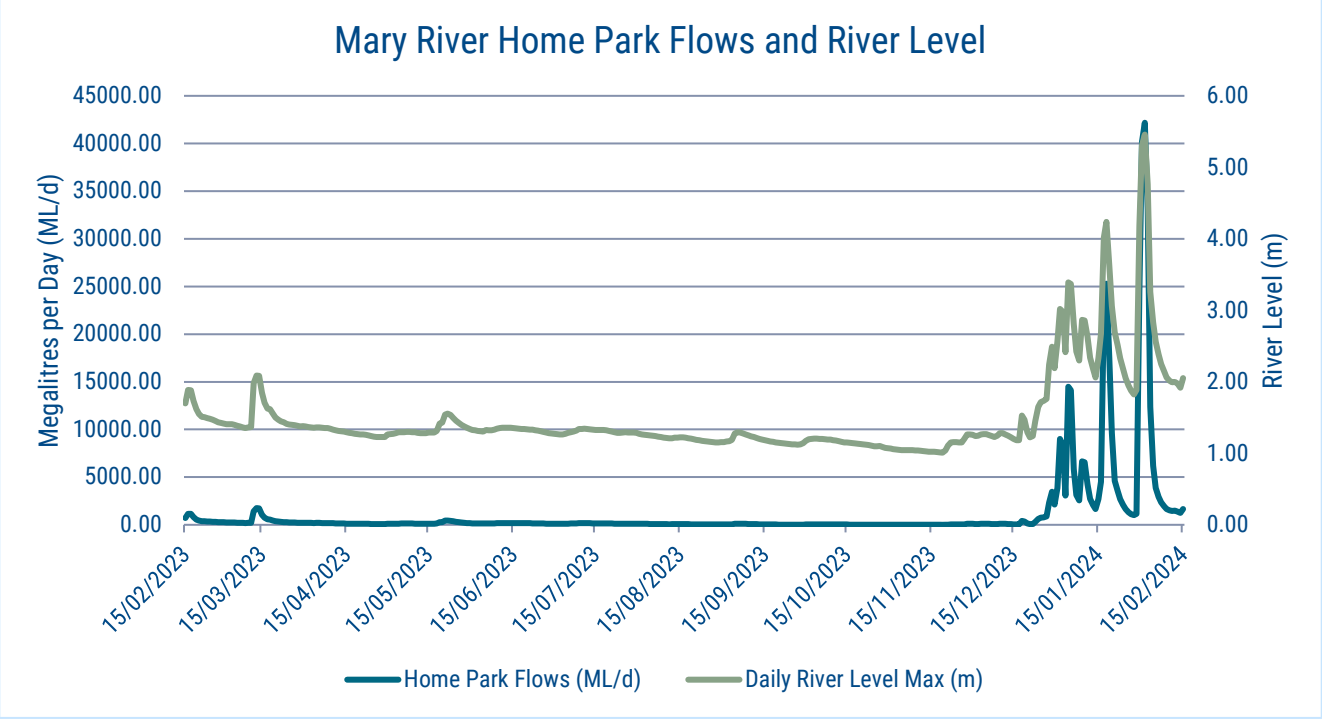


Figure 3. Average Flow Volumes and Water Level at Home Park Gauging Station

2.5.3. Water Transported through NPI2 (Condition 4(c)iii)

Compliance Assessment – Compliant

EPBC Condition 4(c) necessitates the acquisition and maintenance of precise records including:

- *4(c)iii – the amount of water transported through the NPI2.*

Table 6 provides a summary of water transport volumes via the NPI2. During this reporting period, Seqwater facilitated the transportation of approximately 1,164 ML of potable water from the Noosa WTP via the NPI2. Additionally, 1,334 ML of potable water was supplied to the Noosa Zone via NPI2 from other grid-connected assets unrelated to extraction from the Coles Crossing offtake. All records have been maintained and summarised in this report. Daily transfer volumes can be provided to DCCEEW upon request.

Table 6. Water Transport Volumes Through NPI Stage 2

Month	Northern Flow *"Import to Noosa Zone"* (ML)	Southern Flow *"Export from Noosa Zone"* (ML)
February 2023*	95	0
March 2023	226	0
April 2023	86	112
May 2023	44	194
June 2023	228	0
July 2023	221	0
August 2023	58	266
September 2023	37	185
October 2023	106	71
November 2023	74	112
December 2023	20	126
January 2024	62	97
February 2024*	77	0
TOTAL	**1,334**	**1,164**

*Flow volumes are calculated from 15 February 2023 to 15 February 2024 to align with the reporting period.

2.6. EPBC Condition 5

Compliance Assessment – Compliant

EPBC Condition 5 necessitates the acquisition of data in accordance with Condition 4(c) and its submission to DCCEEW on an annual basis.

EPBC Condition 5 necessitates the acquisition and maintenance of data in accordance with Condition 4(c) and its submission to DCCEEW annually. This annual compliance report has been compiled and submitted to fulfill the obligation for the 2023-2024 reporting period, with all records maintained and summarised in this report.

2.7. EPBC Condition 7

Compliance Assessment – Compliant

EPBC Condition 7 stipulates that any revised plans or programs must receive approval from the Minister before implementation.

During this reporting period, no activities were conducted outside the scope of these conditions, and no written approval from the Minister was sought for any revised plans or programs prior to their implementation.

As mentioned in **Sections 2.5.2.1 and 2.5.2.2**, the OEMP specifies the use of an Acoustic Doppler for flow monitoring; however, significant data gaps have been observed in the Doppler data recorded. During this reporting period, discharge data generated using an industry-standard method was utilised to complement the Doppler data. As this approach is considered more reliable for assessing operations to meet monitoring program objectives and approval requirements, Seqwater intends to seek approval to revise the OEMP requirements accordingly for future reports.

2.8. EPBC Condition 9

Compliance Assessment – Compliant

EPBC Condition 9 mandates that the transport of water through the NPI2 must be conducted in the following order of preference:

- *(a) 1st preference - (run of river) water harvested from the Mary River main channel at the Coles Crossing offtake when flow at the pump station is at or above 90 ML/day and flow at Home Park gauging station is at above 20 ML/day; or otherwise*
- *(b) 2nd preference - (controlled release from Borumba Dam) taking high priority allocation released made from existing allocations from Borumba Dam (at the Coles Crossing offtake) of no more than 20 ML/day up to a total of 6500 ML/annum, when flow at the pump station is below 90 ML/day and flow at Home Park gauging station is below 20 ML/day.*

2.8.1. Mary River Run of River (1st Preference) (Condition 9(a))

Compliance Assessment – Compliant

1st preference water harvesting from the Mary River Coles Crossing offtake was initiated for raw water supply to Noosa WTP from 02/01/24 – 15/02/24. During this period, controlled releases from Borumba Dam were not active, while flows at Coles Crossing and Home Park gauging stations were above 90 ML/d and 20 ML/d, respectively. 1st preference water harvesting volumes can be provided to DCCEEW upon request.

2.8.2. Controlled Releases from Borumba Dam (2nd Preference) (Condition 9(b))

Compliance Assessment – Complaint

During this reporting period, 2nd preference water harvesting was initiated for raw water supply to Noosa WTP for a total of 321 days. Within these 321 days, flows at Coles Crossing and Home Park gauging stations were below 90 ML/d and 20 ML/d, respectively, for 28 days (8.7%) across the following periods:

- 24/09/23 – 28/09/23
- 20/10/23 – 21/11/23

Furthermore, flows at Coles Crossing offtake and Home Park gauging station exceeded 90 ML/d and 20 ML/d, respectively, for 21 days (6.5%). However, flows at Coles Crossing offtake remained below 90 ML/d, and flows at

Home Park gauging station remained above 20 ML/d for the majority of the time, accounting for 262 days (81.6%) during the reporting period.

It is important to note that controlled releases from Borumba Dam were active during all 321 2nd preference days for the primary purposes of supplying water to high-priority users downstream, including irrigation customers and Gympie Regional Council.

The total volume of controlled release water from Borumba Dam throughout the current reporting period amounted to approximately 11,250 ML. **Table 7** provides a monthly summary of the Controlled releases from Borumba Dam. 2nd preference water harvesting volumes can be provided to DCCEEW upon request.

Table 7. Borumba Dam Controlled Releases

Month	Controlled Releases from Borumba Dam (ML)
February 2023*	76
March 2023	226
April 2023	581
May 2023	413
June 2023	249
July 2023	272
August 2023	1,496
September 2023	1,828
October 2023	2,926
November 2023	2,372
December 2023	807
January 2024	3
February 2024*	0
TOTAL	**11,250**

*Controlled releases are calculated from 15 February 2023 to 15 February 2024 to align with the reporting period.

2.9. EPBC Condition 10

Compliance Assessment – Compliant

During this reporting period, a total of 3,595 ML of water was extracted from the Coles Crossing offtake, adhering to the existing water extraction entitlement. This volume represents approximately 55.3% of the 6,500 ML annual extraction entitlement. Refer to **Table 2** for monthly extraction volumes. Additionally, it is worth noting that the current extraction and transportation capacity of the Coles Crossing pump station is 20 ML/d, thereby physically limiting daily extraction volumes to 20 ML.

2.10. EPBC Condition 11

Compliance Assessment – Compliant

No State water licenses were issued for the operation of NPI2 during this reporting period.

2.11. EPBC Condition 12

Compliance Assessment – Compliant

As this report fulfills the requirement for lodging a statement of compliance under EPBC Condition 11, it also satisfies the requirements for EPBC Condition 12.

2.12. EPBC Condition 15

Compliance Assessment – Compliant

Seqwater is committed to maintaining accurate records as mandated by the active conditions of approval related to the operation of NPI2. Records of activities associated with or pertinent to the conditions of approval, beyond what has been outlined in this report, can be provided to the DCCEEW upon request.

Records of all activities related to the EPBC Conditions of approval have been maintained, with the exception of the Acoustic Doppler data gaps from Coles Crossing offtake (refer to **Section 2.5** for further details).

2.13. EPBC Condition 16

Compliance Assessment – Compliant

This report fulfills the requirement for lodging annual compliance reports for the NPI2 project and consequently satisfies the requirements for EPBC Condition 16.

3. Aquatic Habitat Monitoring Program (AHMP) Overview

In accordance with CG Condition 32, Seqwater engaged a qualified consultant to conduct the annual AHMP survey in October 2023 across five sites (three on the Mary River and two on Six Mile Creek) during the operation of the NPI2. The consultant also compiled the AHMP Report, available in Appendix A, which compares the survey results to the baseline survey conducted in October 2013 and subsequent annual survey findings from 2014 to 2022. This comparison aims to assess any changes to the aquatic habitat of species identified as Matters of National Environmental Significance (MNES) and determine whether any observed changes are attributable to the operation of NPI2. The following provides a brief overview of the key findings from the *Northern Pipeline Interconnector Stage 2 Project: Aquatic Habitat Monitoring Program Operational Phase 2023 Survey* prepared by frc environmental:

- In October 2023, suitable or potentially suitable habitat for MNES species such as Mary River Cod, Australian Lungfish, White-Throated Snapping Turtle, and Mary River Turtle was observed at all sites on the Mary River.
- Australian Lungfish and unidentified turtles were spotted in the Mary River during this survey.
- While Six Mile Creek has sporadically hosted Australian Lungfish, it is not their preferred habitat, suggesting a low likelihood of a significant population.
- Habitat conditions in Six Mile Creek are favourable for Mary River Turtle and White-Throated Snapping Turtle, but no sightings of these species were recorded, indicating they would occur in low abundance.
- The predominantly shallow pools in Six Mile Creek suggest limited availability of deeper habitats favoured by adult Mary River Cod, although these pools likely support juvenile and intermediate-sized Mary River Cod.
- Water level data at the survey site indicated consistently less favourable depths over the 12 months leading up to the survey, with an average depth decline from 1.2 to 2.3 meters observed between 2013 and 2022.

- Despite these changes, the overall habitat suitability for MNES species in the Mary River and Six Mile Creek has remained relatively stable compared to the November 2022 survey.

4. Conclusion

During the reporting period, the NPI2 pipeline and associated facilities remained operational. Despite successful installation and commissioning of the Acoustic Doppler at Coles Crossing in December 2022 and January 2023 respectively, significant data gaps have been observed in the Doppler data recorded. Due to the challenges posed by the wide and shallow stream profile, coupled with low velocities and base flow, the Doppler method is considered less reliable, particularly under low flow conditions. As a more reliable alternative, discharge data generated using an industry-standard method, widely employed across Seqwater's Hydrographic sites and throughout Australia, was utilised. Although the OEMP specifies the use of the Acoustic Doppler, the industry-standard method is considered more reliable for assessing operations to meet monitoring program objectives and approval requirements. Seqwater intends to seek approval to revise the OEMP requirements accordingly for future reports.

In accordance with CG Condition 32, the annual Aquatic Habitat Monitoring Program (AHMP) survey was conducted in October 2023. Focusing on in-stream aquatic features crucial for the habitat of EPBC Act listed species such as the Mary River Cod, Australian Lungfish, Mary River Turtle, and White-Throated Snapping Turtle in the Mary River and Six Mile Creek, the 2023 survey marks the tenth undertaken during the operational phase of the NPI2. Results indicate that the overall habitat suitability for MNES species in these areas has remained relatively stable compared to the previous November 2022 survey. The AHMP Report detailing these findings has been included in Appendix A.

Throughout this reporting period, Seqwater is not aware of any events with the potential to significantly impact EPBC Act listed species or MNES and no incidents necessitating notification to DCCEEW occurred. Seqwater remains committed to ongoing compliance, continuous improvement, and the prevention and mitigation of potential impacts to environmental values within and surrounding its facilities and assets.

Appendix A - Aquatic Habitat Monitoring Program (AHMP) Report

Northern Pipeline Interconnector Stage 2 Project

Aquatic Habitat Monitoring Program Operational Phase 2023 Survey

Prepared for:

Seqwater

frc environmental

PO Box 2363, Wellington Point QLD 4160
Telephone: + 61 3286 3850
Facsimile: + 61 3821 7936

frc reference: 220909

freshwater estuarine marine

Document Control Summary

Project No.:	220909
Status:	Final Report
Project Director:	Ben Cook
Project Manager:	Derek Sun
Title:	Northern Pipeline Interconnector Stage 2 Project: Aquatic Habitat Monitoring Program Operational Phase 2023 Survey
Project Team:	B. Cook, D. Sun, B. Newbery
Client:	Seqwater
Client Contact:	Ashleigh Muir
Date:	28 November 2023
Edition:	220909Ri
Checked by:	B. Cook
Issued by:	Derek Sun

Distribution Record

Seqwater:	as pdf

Contents

Tables

Figures

Maps

Summary

The Northern Pipeline Interconnector Stage 2 (NPI Stage 2) is a 48 km, bi-directional potable water pipeline that, together with Stage 1 of the pipeline, can transport up to 65 megalitres per day (ML/day) of potable water from the Sunshine Coast to Brisbane, and vice versa. The NPI Stage 2 is currently operated by Seqwater and connects to the Noosa Water Treatment Plant (WTP) which can transport a maximum of 20 ML/day of potable water to NPI Stage 2.

In accordance with condition 32 of the Queensland Coordinator General's approval of the Environmental Impact Statement, an Aquatic Habitat Monitoring Program (AHMP) was developed for the operational phase of NPI Stage 2. In the AHMP, in-stream aquatic features that provide habitat for the Mary River cod (*Maccullochella peeli mariensis*), Australian Lungfish (*Neoceratodus forsteri*), Mary River turtle (*Elusor macrurus*) and White-Throated Snapping turtle (*Elseya albagula*) (i.e. Matters of National Environmental Significance) in the Mary River and in Six Mile Creek are monitored.

This report presents the results of the tenth survey during operation of the NPI Stage 2 (October 2023), and compares them to results from the baseline survey in October 2013, and subsequent annual surveys in November 2014, November 2015, October 2016, November 2017, November 2018, October 2019, October 2020, October 2021 and November 2022. In particular, the following issues are addressed:

- if there have been any changes to the aquatic habitat of species that are Matters of National Environmental Significance (MNES), and
- whether any identified changes are likely to be due to the operation of NPI Stage 2.

In October 2023, as in previous surveys, there was suitable or potentially suitable habitat for Mary River cod, Australian Lungfish, White-Throated Snapping turtle and Mary River turtle (i.e. the MNES species) at all of the sites on the Mary River. Australian Lungfish and unidentified turtles were observed at sites in the Mary River in this survey. While Australian Lungfish have been sporadically documented in Six Mile Creek, the habitat in Six Mile Creek is not their preferred habitat and thus the likelihood of a significant Australian Lungfish population in Six Mile Creek is low (frc environmental 2018). Similarly, while there are favourable habitat conditions for the Mary River turtle and White-Throated Snapping turtle in Six Mile Creek, there have been no recorded sightings of these species in the area, and these species would occur only in low abundance. The presence of predominantly shallow pools in Six Mile Creek suggests a limited availability of deeper habitats, which are typically favoured by adult Mary River cod at the surveyed sites. Nevertheless, these shallow pools are likely supportive of juvenile and intermediate-sized Mary River Cod. This observation

is further supported by the station's water level data, which indicated a consistent and less favourable depth, averaging approximately 0.5 – 1.0 meters, over the 12 months leading up to this survey. This represents a noticeable decline from the average range observed between 2013 and 2022, which ranged from 1.2 to 2.3 meters. Comparing the current conditions to those observed during the November 2022 survey, the overall habitat suitability for MNES species in the Mary River and Six Mile Creek has remained relatively stable.

1 Introduction

1.1 Project Background

The Northern Pipeline Interconnector Stage 2 (NPI Stage 2) is a 48 km, bi-directional potable water pipeline that, together with Stage 1 of the pipeline, can transport up to 65 megalitres per day (ML/day) of potable water from the Sunshine Coast to Brisbane, and vice versa. The NPI Stage 2 is currently operated by Seqwater and connects to the Noosa Water Treatment Plant (WTP), which can transport a maximum of 20 ML/day of potable water to NPI Stage 2.

The Noosa WTP has a maximum design capacity of 45 ML/day. The WTP can extract water from the off-take at Coles Crossing and directly from Lake Macdonald. The Coles Crossing off-take has a maximum design capacity of 20 ML/day (with suitable raw water quality), which is the same as the existing entitlement held by the SEQ Grid Manager (now merged with Seqwater) within the upper Mary River Water Supply Scheme under the *Water Resource (Mary Basin) Plan 2006* (Queensland Government, 2006).

The Environmental Impact Statement (EIS) and associated approvals for the Project were based on the total daily transport volume being no greater than 20 ML/day. Any future increases in water extraction will require additional impact assessments, and an upgrade of the Coles Crossing off-take infrastructure.

In accordance with condition 32 of the Queensland Coordinator General's approval decision, an Aquatic Habitat Monitoring Program (AHMP) was developed for the operational phase of the project, as detailed in the EIS. This operational phase AHMP was based on the AHMP for the construction phase of this project, which was endorsed by the Department of Sustainability, Environment, Population and Communities (DSEWPaC). The AHMP comprised the monitoring of in-stream aquatic features that provide habitat for the Mary River cod (*Maccullochella peeli mariensis*), the Australian Lungfish (*Neoceratodus forsteri*), the Mary River turtle (*Elusor macrurus*) and White-Throated Snapping turtle (*Elseya albagula*) in the Mary River and in Six Mile Creek. These species are threatened species, listed under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and are collectively referred to as the aquatic Matters of National Environmental Significance species (i.e. the MNES species).

1.2 Scope and Aims

This report presents the results of the tenth survey during operation of the NPI Stage 2 (October 2023), and compares them to results from the baseline survey in October 2013, and subsequent annual surveys in November 2014, November 2015, October 2016, November 2017, November 2018, October 2019, October 2020, October 2021 and November 2022. In particular, the following issues are addressed:

- if there have been any changes to the preferred aquatic habitat for species that are Matters of National Environmental Significance (MNES), and
- whether any identified changes are likely to be due to the operation of NPI Stage 2.

1.3 Description of the Survey Area

The Mary River and Six Mile Creek are in the Mary River Basin. The source of the Mary River is in the Sunshine Coast Hinterland near the township of Conondale. The river flows north from the source, for approximately 290 km, past the towns of Kenilworth, Gympie, Tiaro and Maryborough before flowing to the Great Sandy Strait near Hervey Bay (Map 1.1). The Coles Crossing off-take is on the Mary River upstream of the confluence with Six Mile Creek.

The predominant land use in the Mary River Basin is grazing on cleared land; however, there are also several forestry reserves, national parks, and rural and urban areas throughout the basin (Johnson 1997). There are numerous weirs and dams along the Mary River and its tributaries, including Borumba Dam, Lake Baroon, Tallegalla Weir, Teddington Weir and the Mary River Barrage.

Six Mile Creek is a tributary of the Mary River, originating inland from Noosa Heads and flowing for approximately 60 km north-west to join the Mary River approximately 4.5 km south of Gympie (Map 2.1). Lake Macdonald is in the upper reaches of Six Mile Creek.

Aquatic Habitat Monitoring Program

Map 1.1:
Survey area within the Upper Mary River Sub-basin

LEGEND

- Coles Creek Crossing Off-take
- Survey Area
- Mary River Basin
- Watercourse
- Lake/Reservoir
- Highway / Major Road

Sub-basins

- Upper Mary River
- Other Sub-basin

frc environmental
AQUATIC ECOLOGISTS
deep thinking. science.

PO Box 2363
Wellington Point
Q 4160 Australia

P 07 3286 3850
E info@frcenv.com.au
www.frcenv.com.au

DATE	DRAWN BY	VERSION	PROJECTION
2017-11-10	AB	01	Coordinate System: GCS GDA 1994 Datum: GDA 1994 Units: Degree

Document Path: Y:\Mappings\Mappings\170904_SEQ_AHMP-2017\Workspaces\170904_catchment_map_17-11-10_AB.mxd

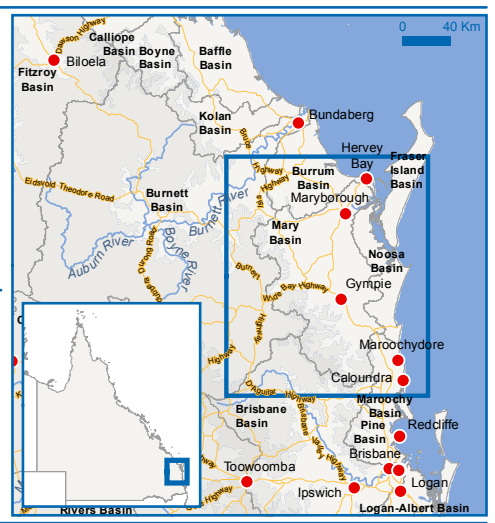
N

SCALE

0 5 10 20 30

Kilometres

Scale: 1:600,000 @ A3



2 Methods

2.1 Survey Timing

The survey was completed on 05 and 06 October 2023.

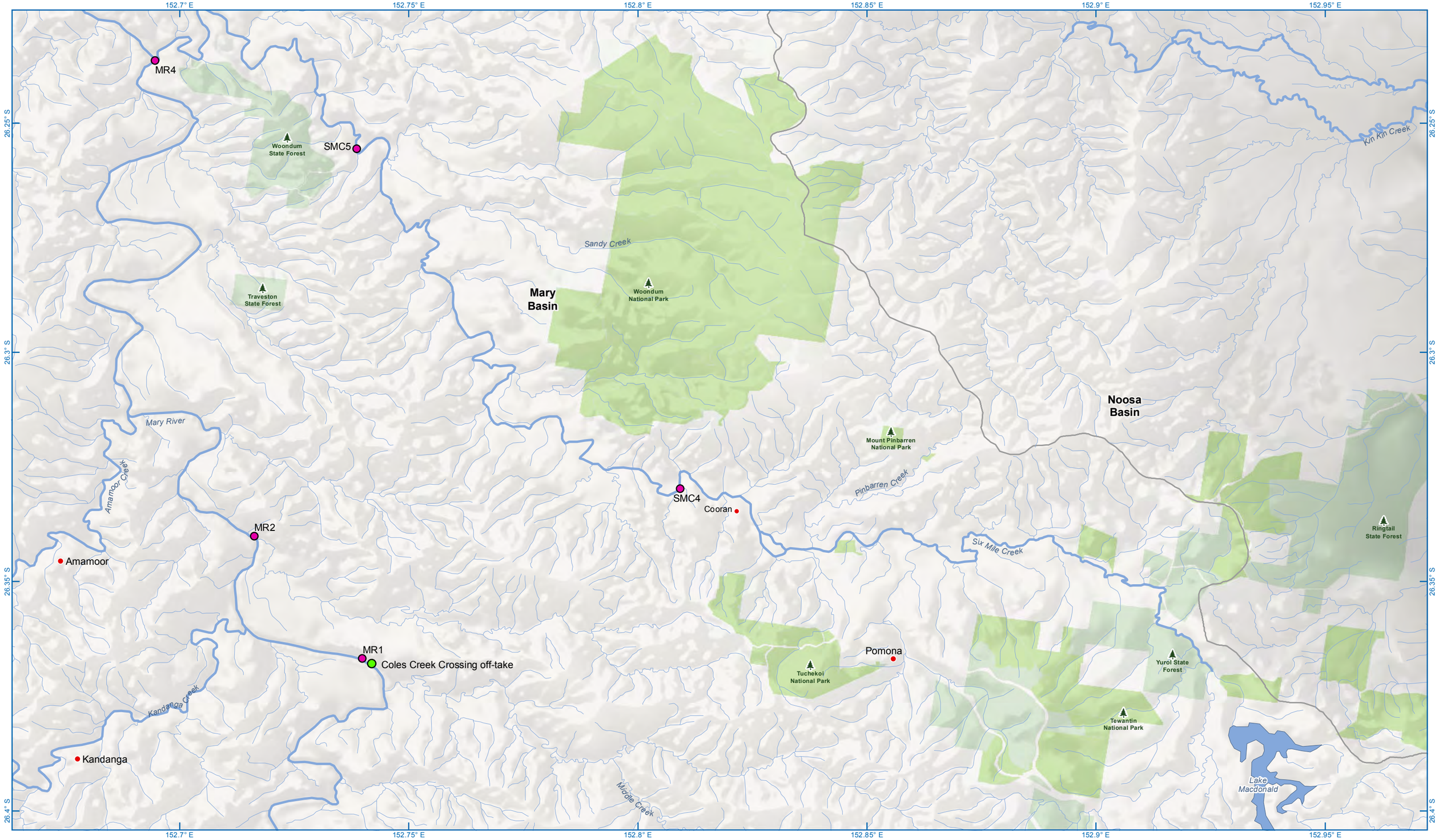
2.2 Site Details

Five sites were surveyed: three sites on the Mary River and two sites on Six Mile Creek (Table 2.1).

Each site was 100 m in length, extending 50 m upstream and 50 m downstream of the mid-site point.

Table 2.1 Mid-point of survey sites.

Site	Description	WGS84 (Zone 56J)	
		Easting	Northing
Mary River			
MR1	250 m downstream of the Coles Creek Crossing off-take.	474050	7083669
MR2	5 km downstream of the Coles Creek Crossing off-take.	471688	7086616
MR4	27 km downstream of the Coles Creek Crossing off-take; at the confluence of Six Mile Creek and the Mary River.	469503	7098101
Six Mile Creek			
SMC4	Main channel of Six Mile Creek; 28 km upstream of the confluence of Six Mile Creek and the Mary River.	480965	7087785
SMC5	Main channel of Six Mile Creek; 11 km upstream of the confluence of Six Mile Creek and the Mary River.	473906	7095982



frc environmental
AQUATIC ECOLOGISTS
deep thinking. science.

PO Box 2363
Wellington Point
Q 4160 Australia

P 07 3286 3850
E info@frcenv.com.au
www.frcenv.com.au

Aquatic Habitat Monitoring Program

Map 2.1:
Survey site locations

SOURCES

Document Path: Y:\Projects\2014\141105_SEQ_AHMP_2014\Mapping\Workspaces\141105SM_sitemap_14-12-23_CF.mxd

LEGEND

- Survey Site
- Coles Creek Crossing Off-take
- Watercourse
- Lake/Reservoir

Protected Area

- National Park
- Other Reserve

N

SCALE

0 1 2 4
Kilometres

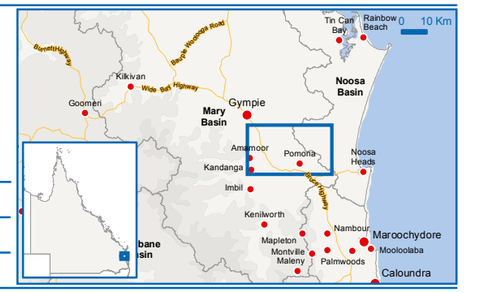
Scale: 1:85,000 @ A3

PROJECTION
Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

DATE
2014-12-23

DRAWN BY
CF

VERSION
01



2.3 Survey Methods

Antecedent Rainfall and Flow Assessment

Rainfall and flow data for the 12 months prior to the survey were obtained to assess temporal variation in flow leading up to the survey.

Rainfall data from the following weather stations were collated and reviewed:

- Gympie (within the survey area); station number 40093, and
- Kenilworth (upper catchment region); station number 40106.

Stream flow data from the following stream flow monitoring stations were collated and reviewed:

- Six Mile Creek at Cooran (within survey area); station number 138107B
- Mary River at Moy Pocket (upper catchment region); station number 138111A
- Mary River at Fisherman's Pocket (downstream of survey area); station number 138007A.

Water Quality

All water quality measurements were taken 30 cm below the surface of the water at the mid-point of each site. A calibrated Insitu Inc. Aquatroll Multiparameter water quality meter was used to measure:

- water temperature (ºC)
- pH
- dissolved oxygen (% saturation and mg/L), and
- electrical conductivity (µS/cm).

Turbidity was measured using a calibrated HACH 2100Q portable turbidity meter.

Flow Conditions and Flow Habitats

The presence / absence of the following flow habitats was noted at each site:

- isolated in-channel pool
- connected in-channel pool
- riffle, and
- run.

The flow velocity of water was measured using a flow meter. Flow velocity was measured in the middle of the channel, at three locations at each site:

- downstream end of site (50 m downstream from mid-point)
- mid-point of site, and
- upstream end of site (50 m upstream from mid-point).

Three cross-sectional depth profiles were completed at each site at the:

- downstream end of site (50 m downstream from mid-point)
- mid-point of site, and
- upstream end of site (50 m upstream from mid-point).

For each profile, the water depth was measured at 0.5 m intervals along transects from the left bank to the right bank across the watercourse, with a waypoint recorded on a GPS where the depth profile was recorded (Appendix A). On the Mary River, channel depth profiles were recorded from a boat using a Hondex Portable Handheld Depth Sounder, while on Six Mile Creek, they were recorded on-foot using a weight rope marked at 0.5 m intervals.

Adjacent Land Uses and Riparian Zone Disturbances

At each site, the land use adjacent to each bank was recorded, and the following were visually assessed:

- riparian vegetation cover and condition, and
- stream bank stability, noting slope, composition (i.e. silt, sand, gravel, etc.), stability, and any notable areas and likely causes of erosion.

Photo-point Monitoring

To maintain a visual record of each site, nine photographs were taken at each site:

- 3 photographs at the downstream end of the site (50 m downstream from mid-point) – upstream mid-channel, upstream left bank and upstream right bank
- 3 photographs at the mid-point of the site – upstream mid-channel, upstream left bank and upstream right bank, and
- 3 photographs at the upstream end of the site (50 m upstream from mid-point) – upstream mid-channel, upstream left bank and upstream right bank.

MNES Habitat Assessment

At each site, the presence / absence of the following habitat features were noted to assess the suitability of the site for the MNES species (i.e. Mary River cod, Mary River turtle, White-Throated Snapping turtle and Australian Lungfish):

- flow habitats (as described above)
  - isolated pool in channel (noting pool depths from channel depth profiles)
  - connected pool in channel (noting pool depths from channel depth profiles)
  - riffle
  - run
- submerged woody debris
  - leaves and twigs (also noting whether cover was sparse or dense)
  - branches < 300 mm diameter (noting whether branches are individual branches or branch piles (or both))
  - branches > 300 mm diameter (also noting whether branches are individual branches or branch piles (or both))
- submerged boulders and rocky crevices
- submerged aquatic plants (also noting whether they were isolated, and whether cover was sparse or dense)
- emergent logs, boulders or other habitat features that allow for turtle basking, and
- sandy banks with sparse vegetation that would allow for turtle nesting.

3 Results

3.1 Antecedent Rainfall and Flow

There was no notable rainfall prior to the survey and limited rainfall immediately before the survey (Figure 3.1). There were two large rainfall event (i.e. > 30 mm) in the upper catchment in the 12 months prior to the survey: October 2022 and May 2023. Rainfall over the past 12 months was below the long-term average recorded at both Kenilworth and Gympie (Figure 3.2), with the exception of October 2022 at both Kenilworth and Gympie.

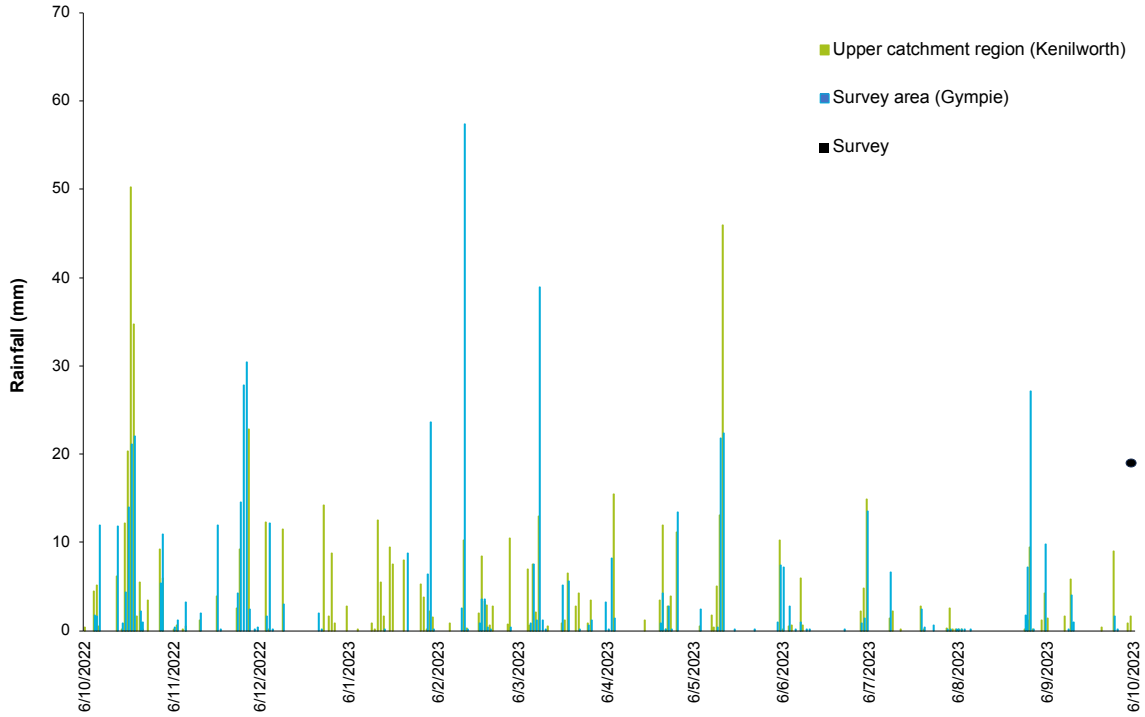


Figure 3.1 Total daily rainfall twelve months prior to the October 2023 survey in the survey area (Gympie) and upper catchment (Kenilworth) (BOM 2023).

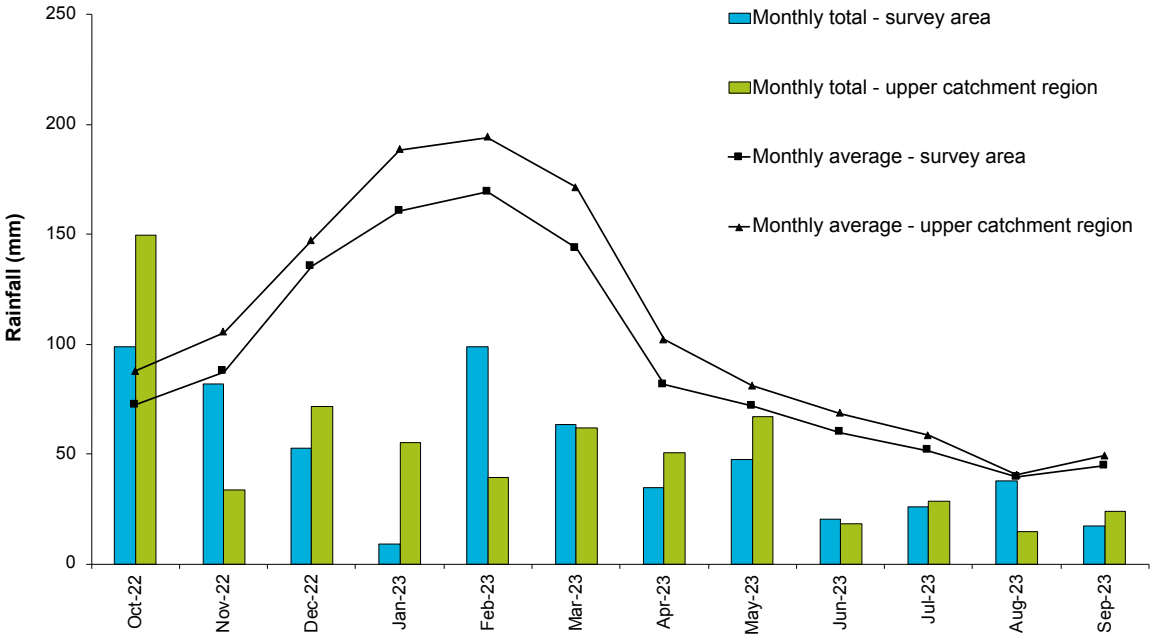


Figure 3.2 Total monthly rainfall for twelve months prior to the 2023 survey and long term mean rainfall for each month in the survey area (Gympie) and the upper catchment region (Kenilworth) (BOM 2023).

Flow and water levels in the Mary River and Six Mile Creek were consistently low, except in October 2022 where there was a brief high flow event (Figure 3.3 and Figure 3.4). In the 12 months prior to the survey the maximum recorded high flow event in the Mary River (i.e. 30,314 ML/day) was recorded in October 2022. The maximum recorded high flow event for the Mary River in 2023 was recorded in June (i.e. 642 ML/day), which is significantly lower than the levels observed during the last few months of 2022.

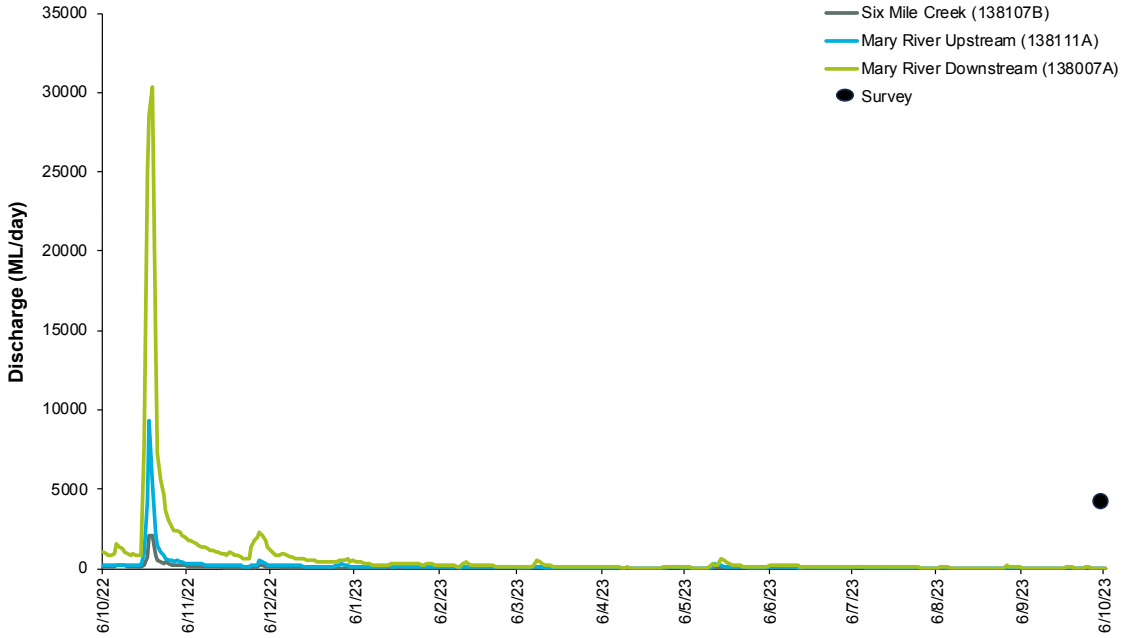


Figure 3.3 Mean daily discharge recorded at stream flow monitoring stations on Six Mile Creek and Mary River (DNRME 2023).

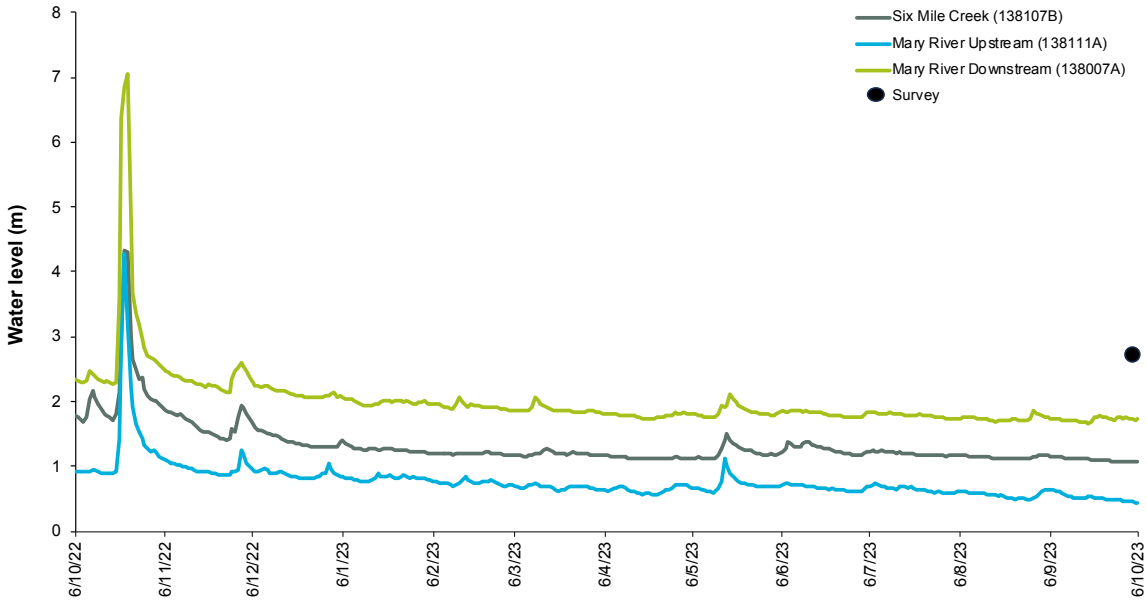


Figure 3.4 Mean daily water level recorded at stream flow monitoring stations on Six Mile Creek and Mary River (DNRME 2023).

3.2 Reach-scale Assessment, Photographic Monitoring and MNES Habitat Assessment

The full results, including the photographic monitoring and the MNES habitat assessment, are presented in Appendix B.

In general, sites on the Mary River had:

- moderate to good water quality, although turbidity was slightly lower across the sites than in 2022
- moderate to very high levels of disturbance in adjacent catchment and riparian areas, and
- a range of habitat features, including:
  - deep connected pools
  - slow flow
  - large woody debris and
  - boulders.

In general, sites on Six Mile Creek had:

- moderate to good water quality, although turbidity was slightly lower across the sites than in 2022
- moderate to high levels of disturbance in adjacent catchment and riparian areas, and
- a range of habitat features, including:
  - shallow pools
  - riffles and runs
  - rock crevices
  - sandy banks, and
  - submerged and emergent large woody debris.

Preferred habitat features of the MNES species, including the Mary River cod, Australian Lungfish, White-Throated Snapping turtle, and Mary River turtle, are summarised in Table 3.1. The Mary River provides suitable habitat for Mary River cod and Australian Lungfish, and it may be potentially suitable for the White-Throated Snapping turtle and Mary River turtles. Australian Lungfish and unidentified turtles were spotted in the Mary River during

the survey. The habitat in Six Mile Creek was deemed potentially suitable for White-Throated Snapping turtles, Mary River turtles and juvenile Mary River cod but not suitable for Australian Lungfish due to low water levels. However, these conditions may change in future surveys following high-water events.

There was little change in habitat conditions in the Mary River between the October 2013, November 2014, November 2015, October 2016, November 2017, November 2018, October 2019, October 2020, October 2021, November 2022 and October 2023 surveys. Nevertheless, high-flow events in February 2022 led to erosion and a loss of aquatic vegetation in both the Mary River and Six Mile Creek. In Six Mile Creek, water levels were lower than the previous survey, resulting in a slight decline in habitat suitability for Mary River cod and Australian Lungfish but a slight increase for White-Throated Snapping turtles and Mary River turtles.

Table 3.1 Results of habitat assessment for the MNES species in October 2013, November 2014, November 2015, October 2016, November 2017, November 2018, October 2019, October 2020, October 2021, November 2022 and October 2023.

Species	Location	Mary River			Six Mile Creek	
	Survey	MR1	MR2	MR4	SMC4	SMC5
Mary River cod	Oct-13	suitable	suitable	suitable	suitable	suitable
	Nov-14	suitable	suitable	suitable	unsuitable	unsuitable
	Nov-15	suitable	suitable	suitable	potentially suitable	potentially suitable
	Oct-16	suitable	suitable	suitable	potentially suitable	potentially suitable
	Nov-17	suitable	suitable	suitable	potentially suitable	potentially suitable
	Nov-18	suitable	suitable	suitable	potentially suitable	potentially suitable
	Oct-19	suitable	suitable	suitable	potentially suitable	potentially suitable
	Oct-20	suitable	suitable	suitable	potentially suitable	potentially suitable
	Oct-21	suitable	suitable	suitable	potentially suitable	potentially suitable
	Nov-22	potentially suitable	potentially suitable	suitable	potentially suitable	potentially suitable
	Oct-23	suitable	suitable	suitable	potentially suitable	potentially suitable
Australian Lungfish	Oct-13	potentially suitable	suitable	potentially suitable	potentially suitable	potentially suitable
	Nov-14	potentially suitable	suitable	potentially suitable	unsuitable	unsuitable
	Nov-15	potentially suitable	suitable	potentially suitable	unsuitable	unsuitable
	Oct-16	suitable	suitable	suitable	unsuitable	unsuitable
	Nov-17	suitable	suitable	suitable	unsuitable	unsuitable
	Nov-18	suitable	suitable	suitable	unsuitable	unsuitable
	Oct-19	suitable	suitable	suitable	unsuitable	unsuitable

Species	Location	Mary River			Six Mile Creek	
	Survey	MR1	MR2	MR4	SMC4	SMC5
	Oct-20	suitable	suitable	suitable	unsuitable	unsuitable
	Oct-21	suitable	suitable	suitable	unsuitable	unsuitable
	Nov-22	potentially suitable	potentially suitable	suitable	unsuitable	unsuitable
	Oct-23	suitable	suitable	suitable	unsuitable	unsuitable
White-Throated Snapping turtle	Oct-13	suitable	suitable	suitable	potentially suitable	potentially suitable
	Nov-14	suitable	suitable	suitable	potentially suitable	potentially suitable
	Nov-15	suitable	suitable	suitable	potentially suitable	suitable
	Oct-16	suitable	suitable	suitable	suitable	suitable
	Nov-17	suitable	suitable	suitable	suitable	suitable
	Nov-18	suitable	suitable	suitable	suitable	suitable
	Oct-19	suitable	suitable	suitable	potentially suitable	potentially suitable
	Oct-20	suitable	suitable	suitable	potentially suitable	potentially suitable
	Oct-21	suitable	suitable	suitable	potentially suitable	potentially suitable
	Nov-22	potentially suitable	potentially suitable	suitable	potentially suitable	potentially suitable
	Oct-23	potentially suitable	suitable	suitable	potentially suitable	potentially suitable
Mary River turtle	Oct-13	suitable	suitable	suitable	potentially suitable	potentially suitable
	Nov-14	suitable	suitable	suitable	potentially suitable	potentially suitable
	Nov-15	suitable	suitable	suitable	potentially suitable	suitable
	Oct-16	suitable	suitable	suitable	suitable	suitable

Species	Location	Mary River			Six Mile Creek	
	Survey	MR1	MR2	MR4	SMC4	SMC5
	Nov-17	suitable	suitable	suitable	suitable	suitable
	Nov-18	suitable	suitable	suitable	suitable	suitable
	Oct-19	suitable	suitable	suitable	potentially suitable	potentially suitable
	Oct-20	suitable	suitable	suitable	potentially suitable	potentially suitable
	Oct-21	suitable	suitable	suitable	potentially suitable	potentially suitable
	Nov-22	potentially suitable	potentially suitable	suitable	potentially suitable	potentially suitable
	Oct-23	potentially suitable	potentially suitable	suitable	suitable	suitable

4 Summary

In October 2023, as in previous surveys, there was suitable or potentially suitable habitat for Mary River cod, Australian Lungfish, White-Throated Snapping turtle and Mary River turtle (i.e. the MNES species) at all of the sites on the Mary River. Australian Lungfish and unidentified turtles were observed at sites in the Mary River in this survey. Although Australian Lungfish have been sporadically documented in Six Mile Creek, it's important to note that this is not their preferred habitat. The likelihood of a significant Australian Lungfish population in Six Mile Creek is low (frc environmental 2018). Similarly, while there are favourable habitat features for the Mary River turtle and White-Throated Snapping turtle in Six Mile Creek, there have been no recorded sightings of these species in the area. Populations of White-Throated Snapping turtle and Mary River turtle are expected to be low if present in Six Mile Creek. The presence of predominantly shallow pools in Six Mile Creek limited the availability of deeper habitats, which are typically favoured by adult Mary River cod at the surveyed sites. Nevertheless, these shallow pools are likely supportive of juvenile and intermediate-sized Mary River Cod however unlikely to support Australian Lungfish. This observation is further supported by the station's water level data, which indicated a consistent and less favourable depth, averaging approximately 0.5 – 1.0 meters, over the 12 months leading up to this survey. This represents a noticeable decline from the average range observed between 2013 and 2022, which ranged from 1.2 to 2.3 meters. Comparing the current conditions to those observed during the November 2022 survey, the overall habitat suitability for MNES species in the Mary River and Six Mile Creek has remained relatively stable.

5 References

BOM 2023, *Climate Data Online*, Australian Government Bureau of Meteorology, http://www.bom.gov.au/climate/data/index.shtml.

DNRME 2023, *Water Monitoring Information Portal*, Department of Natural Resources, Mines and Energy, https://water-monitoring.information.qld.gov.au/

frc environmental 2018, *Six Mile Creek Dam Safety Upgrade Project: Aquatic Ecology and Water Quality Impact Assessment*, report prepared for SMEC on behalf of Seqwater.

Johnson, DP 1997, *State of the Rivers: Mary River and Major Tributaries, An Ecological and Physical Assessment of the Condition of Streams in the Mary River Catchment*, Department of Natural Resources Brisbane.

Appendix A Geographic Coordinates for Channel Depth Profile Transects

Table A1 Location of depth profile transects at each site.

Site	Location	Description	WGS84 (Zone 56J)	
			Easting	Northing
Mary River				
MR1	Upstream	50 m upstream of the mid-site point	474102	7083677
	Mid	mid-site point	474059	7083702
	Downstream	50 m downstream of the mid-site point	474013	7083711
MR2	Upstream	50 m upstream of the mid-site point	471712	7086605
	Mid	mid-site point	471662	7086657
	Downstream	50 m downstream of the mid-site point	471621	7086696
MR4	Upstream	50 m upstream of the mid-site point	469466	7098056
	Mid	mid-site point	469494	7098096
	Downstream	50 m downstream of the mid-site point	469493	7098147
Six Mile Creek				
SMC4	Upstream	50 m upstream of mid-site point	481028	7087821
	Mid	mid-site point	480990	7087778
	Downstream	50 m downstream of mid-site point	480936	7087759
SMC5	Upstream	50 m upstream of mid-site point	473898	7095948
	Mid	mid-site point	473913	7095972
	Downstream	50 m downstream of mid-site point	473909	7095994

Appendix B Detailed Survey Results

B.1 Site MR1

Results for site MR1 are presented in Table B.1 – B.3, and Figure B.1. Site MR1 had potentially suitable habitat to support all MNES species including Mary River cod, Australian Lungfish, White-Throated Snapping turtles and Mary River turtles.

Table B.1 Site MR1 – water quality, flow, land use, and bed and bank assessment.

Site MR1

Right bank at mid-site

Upstream at mid-site

Left bank at mid-site

Water Quality		**Flow Conditions**			
Temperature (°C)	21.7	Flow habitats present	Connected in-channel pool		
Conductivity (µS/cm)	359.61	Water level	Moderate (at watermark)		
Turbidity (NTU)	9.12	Recent high flow	Yes		
Dissolved oxygen (mg/L)	9.13	**Flow**	**Upstream**	**Mid-site**	**Downstream**
Dissolved oxygen (% sat)	113.57	Depth (m)	1.6	2.6	2.3
pH	7.53	Width (m)	31.0	39.5	40.0
		Velocity (m/s)	0.048	0.025	0.031

Land Use			
Left bank:	Pump station	Right bank:	Grazing
Overall disturbance:	Moderate		
Bank Assessment			
Left Bank		**Right Bank**	
Bank material:	Gravel, sand, clay	Bank material:	Sand, clay
Bank height:	5 m	Bank height:	5 m
Bank slope:	Steep	Bank slope:	Steep
Bank shape:	Concave	Bank shape:	Concave
Vegetation cover:	Moderate	Vegetation cover:	Extensive
Vegetation type:	Grass, shrubs, trees	Vegetation type:	Grass, shrubs, trees
Shading of river:	5%	Shading of river:	5%
Trailing bank vegetation:	10%	Trailing bank vegetation:	5%
Erosion Assessment			
Left Bank		**Right Bank**	
Erosion:	Moderate	Erosion:	Moderate
Stability:	Moderate	Stability:	Moderate
Disturbances:	Weeds, cleared vegetation	Disturbances:	Weeds, cleared vegetation, access tracks
Bed Assessment			
Substrate material:	Pebble, gravel, sand and silt/clay		
Bed stability rating:	Bed stable	Sediment deposits:	Silt snd sand

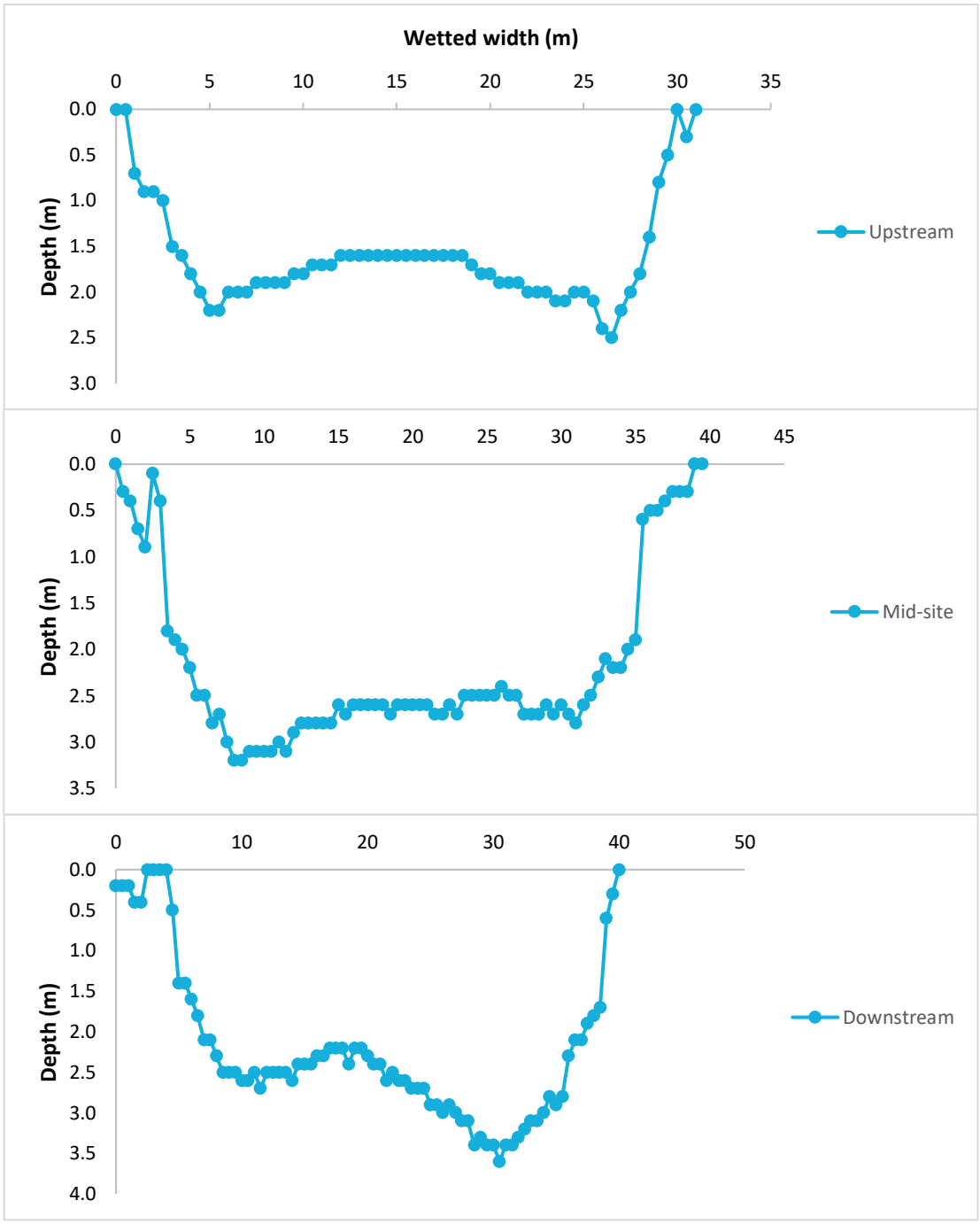


Figure B.1 Site MR1 – channel depth profiles.

Table B.2 Site MR1 – habitat assessment for MNES species

MNES Species Habitat

Connected pool with slow flow

Bar and logs suitable for basking

Submerged logs suitable for refuge

Habitat	**Present / Absent**	**Habitat**	**Present / Absent**
Isolated pools	Absent	Individual log (diameter >250mm)	Present
Connected pools	Present	Individual branch (diameter <300mm)	Present
Riffle	Absent	Branch pile <50% dense (diameter <300mm)	Present
Run	Absent	Branch pile >50% dense (diameter <300mm)	Present
Aquatic vegetation	Present	Log jam <50% dense (diameter >300mm)	Present
Turtle basking spots	Present	Log jam >50% dense (diameter >300mm)	Present
Turtle nesting habitat	Absent	Terrestrial leaves and twigs	Present – sparse
Submerged boulders / rock crevices	Present		
Overall suitability	Suitable		

MNES Species Habitat	
Comments:	Patches of potentially suitable habitat for Mary River cod, White-Throated Snapping turtles, Mary River turtles and Australian Lungfish were scattered throughout the site. Pools were deep to 3 m. Some banks were moderately shaded and contained large woody debris. Turtle basking spots and submerged boulders/rock crevices were present in limited numbers, while turtle nesting habitat were absent at MR1. Aquatic vegetation was present, *Azolla* sp. and water hyacinth sp. found. Turtles were spotted at MR1 (unable to identify species) as well as Australian Lungfish between MR1 and MR2.

B.2 Site MR2

Results for site MR2 are presented in Table B.3 – B.6. Site MR2 had potentially suitable habitat to support the MNES species (Mary River cod, Australian Lungfish, White-Throated Snapping turtle and Mary River turtle).

Table B.3 Site MR2 – water quality, flow, land use, and bed and bank assessment.

Site MR2

Right bank at mid-site

Upstream at mid-site

Left bank at mid-site

Water Quality	
Temperature (°C)	24.19
Conductivity (µS/cm)	404.61
Turbidity (NTU)	8.4
Dissolved oxygen (mg/L)	7.3
Dissolved oxygen (% sat)	86.67
pH	6.96

Flow Conditions			
Flow habitats present	Connected in-channel pool		
Water level	Moderate (at watermark)		
Recent high flow	Yes		
Flow	**Upstream**	**Mid-site**	**Downstream**
Depth (m)	2.9	4.9	3.5
Width (m)	49.0	68.0	61.0
Velocity (m/s)	0.02	0.09	0.03

Land Use			
Left bank:	Grazing	Right bank:	Grazing
Overall disturbance:	High		
Bank Assessment			
Left Bank		**Right Bank**	
Bank material:	Boulder, pebble, gravel, clay	Bank material:	Cobble, sand, silt/clay
Bank height:	8 m	Bank height:	10 m
Bank slope:	Steep	Bank slope:	Moderate
Bank shape:	Convex	Bank shape:	Convex
Vegetation cover:	Moderate	Vegetation cover:	Moderate
Vegetation type:	Grass, shrubs, trees	Vegetation type:	Grass, shrubs, trees
Shading of river:	5%	Shading of river:	5%
Trailing bank vegetation:	5%	Trailing bank vegetation:	10%
Erosion Assessment			
Left Bank		**Right Bank**	
Erosion:	Moderate	Erosion:	Moderate
Stability:	Moderate	Stability:	High
Disturbances:	Erosion	Disturbances:	Erosion, weeds, cleared vegetation, cattle
Bed Assessment			
Substrate material:	Bedrock, boulder, cobble, pebble, gravel, sand, silt/clay		
Bed stability rating:	Moderate erosion	Sediment deposits:	Sand, silt

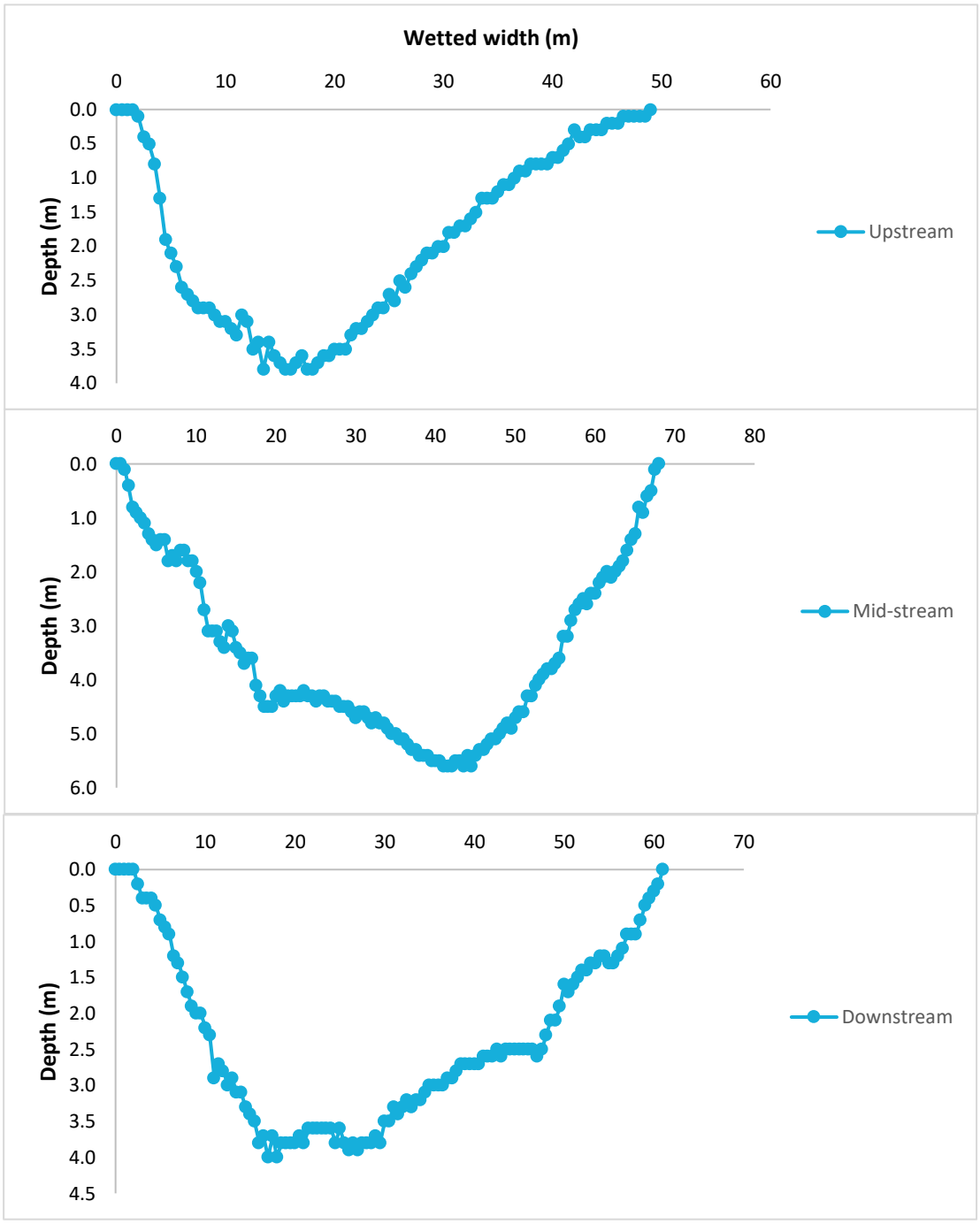


Figure B.2 Site MR2 – channel depth profile.

Table B.4 MR2 – habitat assessment for MNES species.

MNES Species Habitat.			
			
Eroded sandy/pebble banks	Connected pool with slow flow	Rocky banks suitable for basking	
Habitat	**Present / Absent**	**Habitat**	**Present / Absent**
Isolated pools	Absent	Individual log (diameter >250mm)	Present
Connected pools	Present	Individual branch (diameter <300mm)	Absent
Riffle	Absent	Branch pile <50% dense (diameter <300mm)	Absent
Run	Absent	Branch pile >50% dense (diameter <300mm)	Present
Aquatic vegetation	Absent	Log jam <50% dense (diameter >300mm)	Absent
Turtle basking spots	Present	Log jam >50% dense (diameter >300mm)	Absent
Turtle nesting habitat	Absent	Terrestrial leaves and twigs	Present – sparse
Submerged boulders / rock crevices	Present		
Overall suitability	Suitable		

MNES Species Habitat.	
Comments:	Patches of potentially suitable habitat for Mary River turtles and White-Throated Snapping turtles were observed. Some basking locations were largely present however turtle nesting habitats were eroded, reducing habitat suitability. Deep pools (>5 m) throughout the site provide good habitat for both Australian Lungfish and Mary River cod. Submerged large woody debris provide habitat and shelter. Aquatic plants were not observed at site MR2. Turtles were spotted however unable to identify species.

B.3 Site MR4

Results for site MR4 are presented in Table B.5 – B.9. Site MR4 had potentially suitable habitat to support all MNES species (Mary River cod, Australian Lungfish, White Throated Snapping turtle and Mary River turtle).

Table B.5 Site MR4 – water quality, flow, land use, and bed and bank assessment.

Site MR4

Right bank at mid-site

Upstream at mid-site

Left bank at mid-site

Water Quality	
Temperature (°C)	22.2
Conductivity (µS/cm)	490.91
Turbidity (NTU)	7.95
Dissolved oxygen (mg/L)	6.98
Dissolved oxygen (% sat)	80.16
pH	7.25

Flow Conditions			
Flow habitats present	Connected in-channel pool		
Water level	Moderate (at watermark)		
Recent high flow	Yes		
Flow	**Upstream**	**Mid-site**	**Downstream**
Depth (m)	1.7	3.8	0.5
Width (m)	26.0	45.0	38.0
Velocity (m/s)	0.035	0.029	0.046

Land Use			
Left bank:	Grazing	Right bank:	Grazing
Overall disturbance:	High		
Bank Assessment			
Left Bank		**Right Bank**	
Bank material:	Bedrock,sand, gravel, silt/clay	Bank material:	Sand, gravel, silt/clay
Bank height:	5 m	Bank height:	7 m
Bank slope:	Steep	Bank slope:	Steep
Bank shape:	Convex	Bank shape:	Convex
Vegetation cover:	Moderate	Vegetation cover:	Moderate
Vegetation type:	Grass, shrubs, trees	Vegetation type:	Grass, shrubs, trees
Shading of river:	5%	Shading of river:	15%
Trailing bank vegetation:	5%	Trailing bank vegetation:	5%
Erosion Assessment			
Left Bank		**Right Bank**	
Erosion:	Moderate	Erosion:	Moderate
Stability:	Moderate	Stability:	Moderate
Disturbances:	Erosion, cattle and cleared vegetation	Disturbances:	Erosion, cattle and cleared vegetation
Bed Assessment			
Substrate material:	Boulder, cobble, pebble, gravel, sand, silt/clay		
Bed stability rating:	Moderate aggradation	Sediment deposits:	Sand and silt

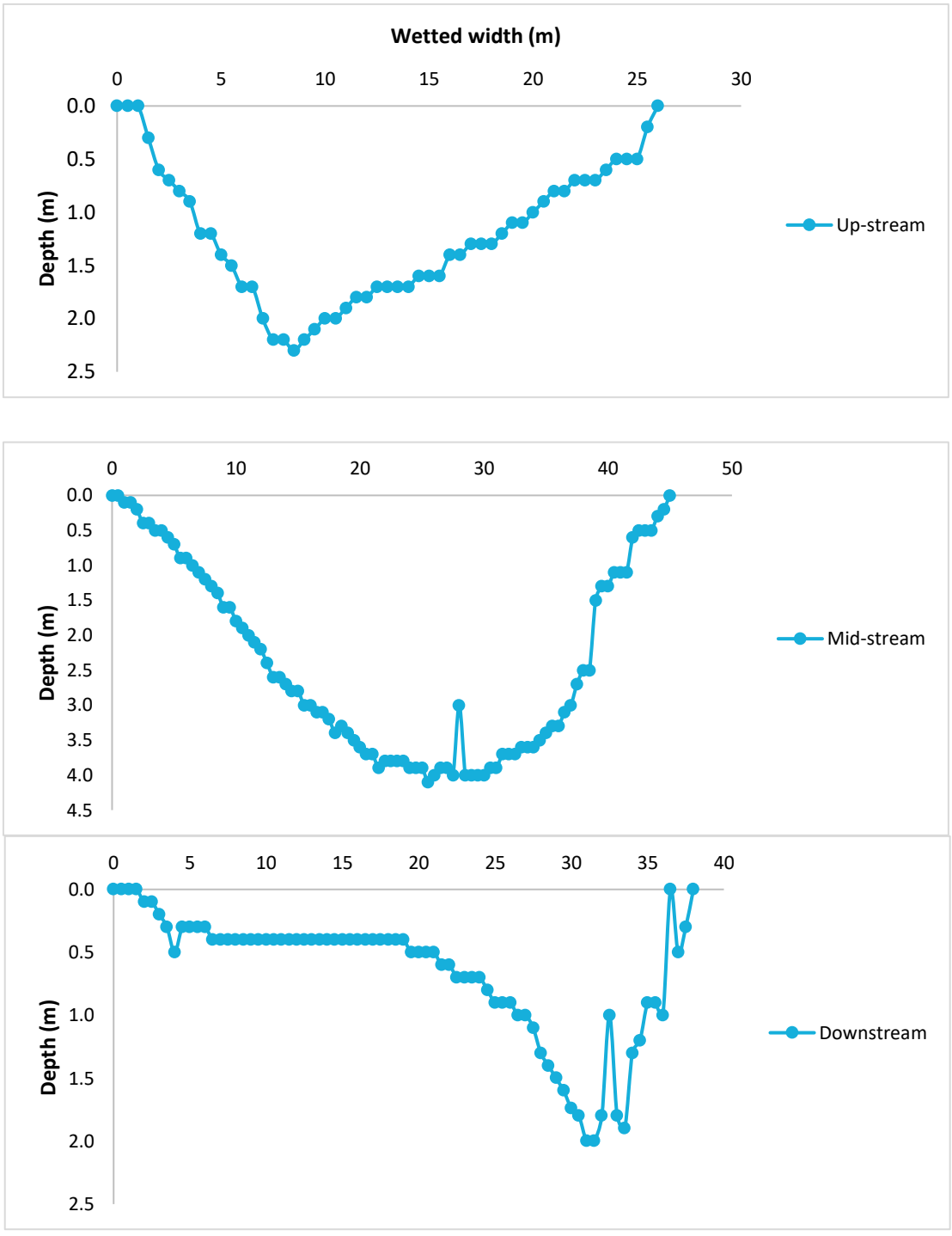


Figure B.3 Site MR4 – channel depth profiles.

Table B.6 Habitat assessment for MNES species at site MR4.

MNES Species Habitat

Logs and woody debris suitable for basking

Sandy bank suitable for nesting

Undercut banks provide habitat

Habitat	**Present / Absent**	**Habitat**	**Present / Absent**
Isolated pools	Absent	Individual log (diameter >250mm)	Present
Connected pools	Present	Individual branch (diameter <300mm)	Present
Riffle	Absent	Branch pile <50% dense (diameter <300mm)	Present
Run	Absent	Branch pile >50% dense (diameter <300mm)	Present
Aquatic vegetation	Present	Log jam <50% dense (diameter >300mm)	Present
Turtle basking spots	Present	Log jam >50% dense (diameter >300mm)	Present
Turtle nesting habitat	Present	Terrestrial leaves and twigs	Present – sparse
Submerged boulders / rock crevices	Present		
Overall suitability	Suitable		

MNES Species Habitat	
	Suitable habitat for Mary River cod, Australian Lungfish, White-Throated Snapping turtles and Mary River turtles was scattered through the site. Deep pools (>4 m) were present throughout the site during the 2023 survey. Most deep pools contained large woody debris. Turtle basking spots were present in the form of exposed logs and few exposed rocks along banks. Sandy banks suitable for nesting habitat were present. Aquatic vegetation present with sparse aggregations of Azolla sp., Vallisneria sp. and Lugwigia sp. Platypus and unidentified turtles spotted at site.

Table B.7 MR4 – Photographic monitoring.

Site MR4

Upstream right bank at upstream site

Upstream at upstream site

Upstream left bank at upstream site

Upstream right bank at mid-site

Upstream at mid-site

Upstream left bank at mid-site

Upstream right bank at downstream site

Upstream at downstream site

Upstream left bank at downstream site

B.5 Site SMC4

Results for site SMC4 are presented in Table B.8 – B.15 and Figure B.4. Site SMC4 had potentially suitable habitat to support White-Throated Snapping turtles and Mary River turtles and juvenile Mary River cod. This site did not have the potential to support Australian Lungfish.

Table B.8 Site SMC4 – water quality, flow, land use, and bed and bank assessment.

Site SMC4

Right bank at mid-site

Upstream at mid-site

Left bank at mid-site

Water Quality	
Temperature (°C)	18.57
Conductivity (µS/cm)	239.64
Turbidity (NTU)	6.48
Dissolved oxygen (mg/L)	1.85
Dissolved oxygen (% sat)	19.77
pH	6.73

Flow Conditions			
Flow habitats present	Connected in-channel pool, riffle, run		
Water level	Low (below watermark)		
Recent high flow	Yes		
Flow	**Upstream**	**Mid-site**	**Downstream**
Depth (m)	0.6	0.9	0.5
Width (m)	6.5	8.0	8.5
Velocity (m/s)	0.002	0.011	0.002

Land Use

Left bank:	Grazing	Right bank:	Grazing
Overall disturbance:	High		
Bank Assessment			
Left Bank		**Right Bank**	
Bank material:	Boulder, sand and silt/clay	Bank material:	Sand and silt/clay
Bank height:	3 m	Bank height:	3 m
Bank slope:	Steep	Bank slope:	Moderate - steep
Bank shape:	Concave	Bank shape:	Convex
Vegetation cover:	Extensive	Vegetation cover:	Extensive
Vegetation type:	Grass, shrubs (*Lomandra* sp.), trees	Vegetation type:	Grass, shrubs (*Lomandra* sp.), trees
Shading of river:	75%	Shading of river:	75%
Trailing bank vegetation:	10%	Trailing bank vegetation:	5%
Erosion Assessment			
Left Bank		**Right Bank**	
Erosion:	Some	Erosion:	Moderate
Stability:	Moderate	Stability:	High
Disturbances:	Roads (bridge), erosion	Disturbances:	Roads (bridge), erosion
Bed Assessment			
Substrate material:	Pebble, gravel, sand, silt/clay		
Bed stability rating:	Moderate aggradation	Sediment deposits:	Sand and silt

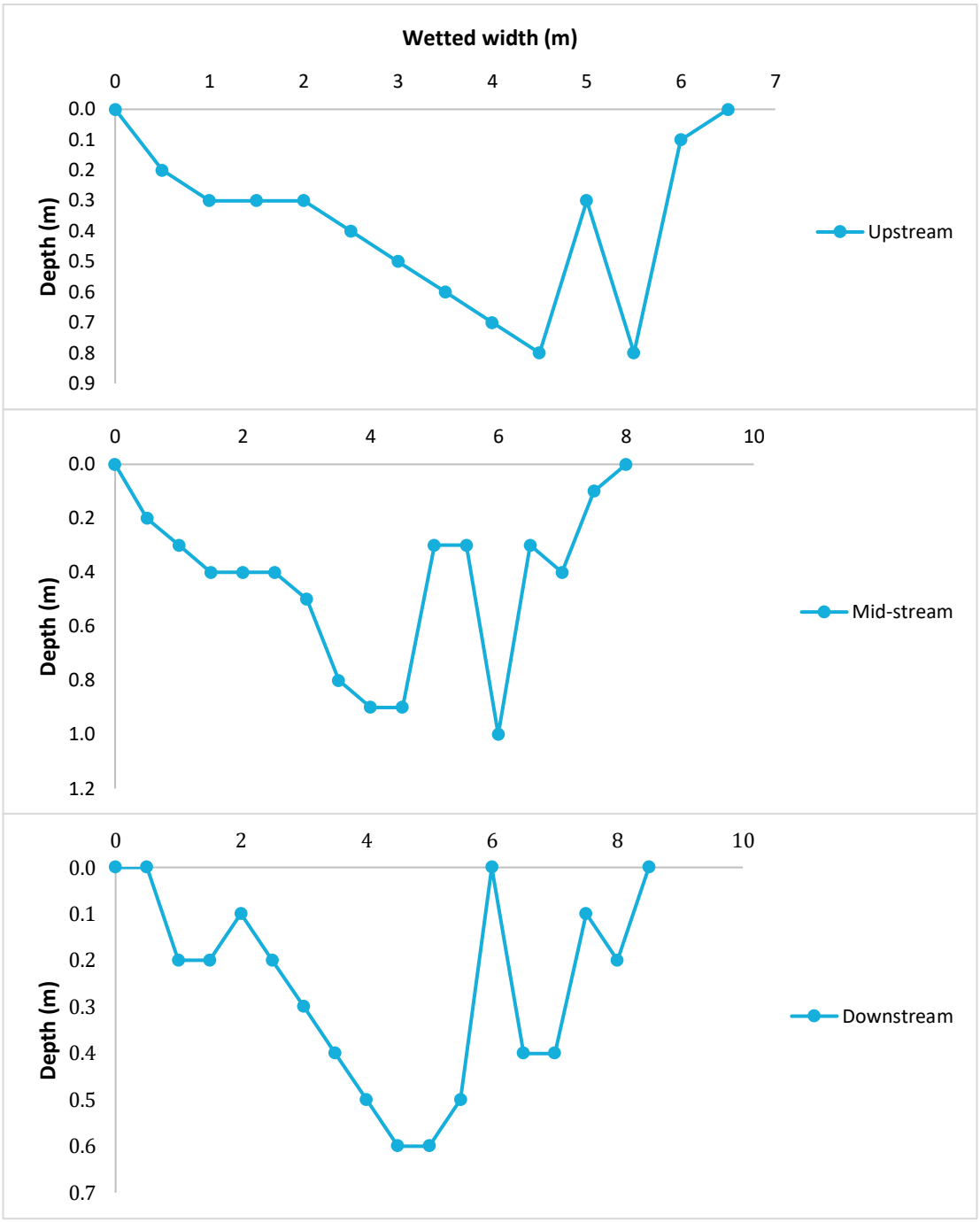


Figure B.3 Site SMC4 – channel depth profiles.

Table B.9 Site SMC4 – habitat assessment for MNES species.

MNES Species Habitat

Woody debris provides basking spot

Undercut banks provide habitat

Sandy bank provides nesting habitat

Habitat	**Present / Absent**	**Habitat**	**Present / Absent**
Isolated pools	Absent	Individual log (diameter >250mm)	Present
Connected pools	Present	Individual branch (diameter <300mm)	Present
Riffle	Present	Branch pile <50% dense (diameter <300mm)	Present
Run	Present	Branch pile >50% dense (diameter <300mm)	Present
Aquatic vegetation	Present	Log jam <50% dense (diameter >300mm)	Present
Turtle basking spots	Present	Log jam >50% dense (diameter >300mm)	Present
Turtle nesting habitat	Present	Terrestrial leaves and twigs	Present – dense
Submerged boulders / rock crevices	Present		

MNES Species Habitat	
Overall suitability	Suitable for White-Throated Snapping turtles and Mary River turtles, potentially suitable for juvenile Mary River cod, not suitable for Australian Lungfish.
Comments:	Extensively shaded, shallow pools (<1 m) throughout the majority of the reach. Submerged woody debris was present across the site, providing potential habitat for juvenile Mary River cod although water level indicates habitat as unsuitable. No suitable habitat for the Australian Lungfish was present. The presence of flowing water in shallow riffles and a sandy substrate provide habitat that is suitable for White-Throated Snapping turtles and Mary River turtles, in addition to sandy nesting habitat on the banks. Woody debris and exposed rocks provided turtle basking spots. Aquatic vegetation present, sparse *Azolla sp*. aggregations.

Table B.10 Site SMC4 – Photographic monitoring.

Site SMC4

Upstream right bank at upstream site

Upstream at upstream site

Upstream left bank at upstream site

Upstream right bank at mid-site

Upstream at mid-site

Upstream left bank at mid-site

Upstream right bank at downstream site

Upstream at downstream site

Upstream left bank at downstream site

B.4 Site SMC5

Results for site SMC5 are presented in Table B.11 – B.12 andFigure B.4. Site SMC5 had potentially suitable habitat for juvenile Mary River cod, White-Throated Snapping turtle and Mary River turtle, but did not have suitable habitat for Australian Lungfish.

Table B.11 Site SMC5 – water quality, flow, landuse, and bed and bank assessment.

Site SMC5

Right bank at mid-site

Upstream at mid-site

Left bank at mid-site

Water Quality	
Temperature (°C)	20.53
Conductivity (µS/cm)	270.5
Turbidity (NTU)	11.9
Dissolved oxygen (mg/L)	2.28
Dissolved oxygen (% sat)	25.41
pH	6.67

Flow Conditions			
Flow habitats present	Connected in-channel pool		
Water level	Low (below watermark)		
Recent high flow	Yes		
Flow	**Upstream**	**Mid-site**	**Downstream**
Depth (m)	0.4	0.3	0.1
Width (m)	6.5	7.5	7.5
Velocity (m/s)	0.05	0.05	0.08

Land Use			
Left bank:	Grazing	Right bank:	Grazing
Overall disturbance:	Moderate		
Bank Assessment			
Left Bank		**Right Bank**	
Bank material:	Boulder, gravel, sand and silt/clay	Bank material:	Gravel, sand, silt/clay
Bank height:	6 m	Bank height:	6 m
Bank slope:	Moderate	Bank slope:	Moderate
Bank shape:	Stepped	Bank shape:	Stepped
Vegetation cover:	Extensive	Vegetation cover:	Extensive
Vegetation type:	Trees, shrubs (*Lomandra* sp.), grass	Vegetation type:	Trees, shrubs (*Lomandra* sp.), grass
Shading of river:	50%	Shading of river:	25%
Trailing bank vegetation:	25%	Trailing bank vegetation:	15%
Erosion Assessment			
Left Bank		**Right Bank**	
Erosion:	Some	Erosion:	Some
Stability:	High	Stability:	Moderate
Disturbances:	Erosion, road (bridge)	Disturbances:	Erosion, road (bridge)
Bed Assessment			
Substrate material:	Boulder, cobble, pebble, gravel, sand, silt/clay		
Bed stability rating:	Bed stable	Sediment deposits:	Silt

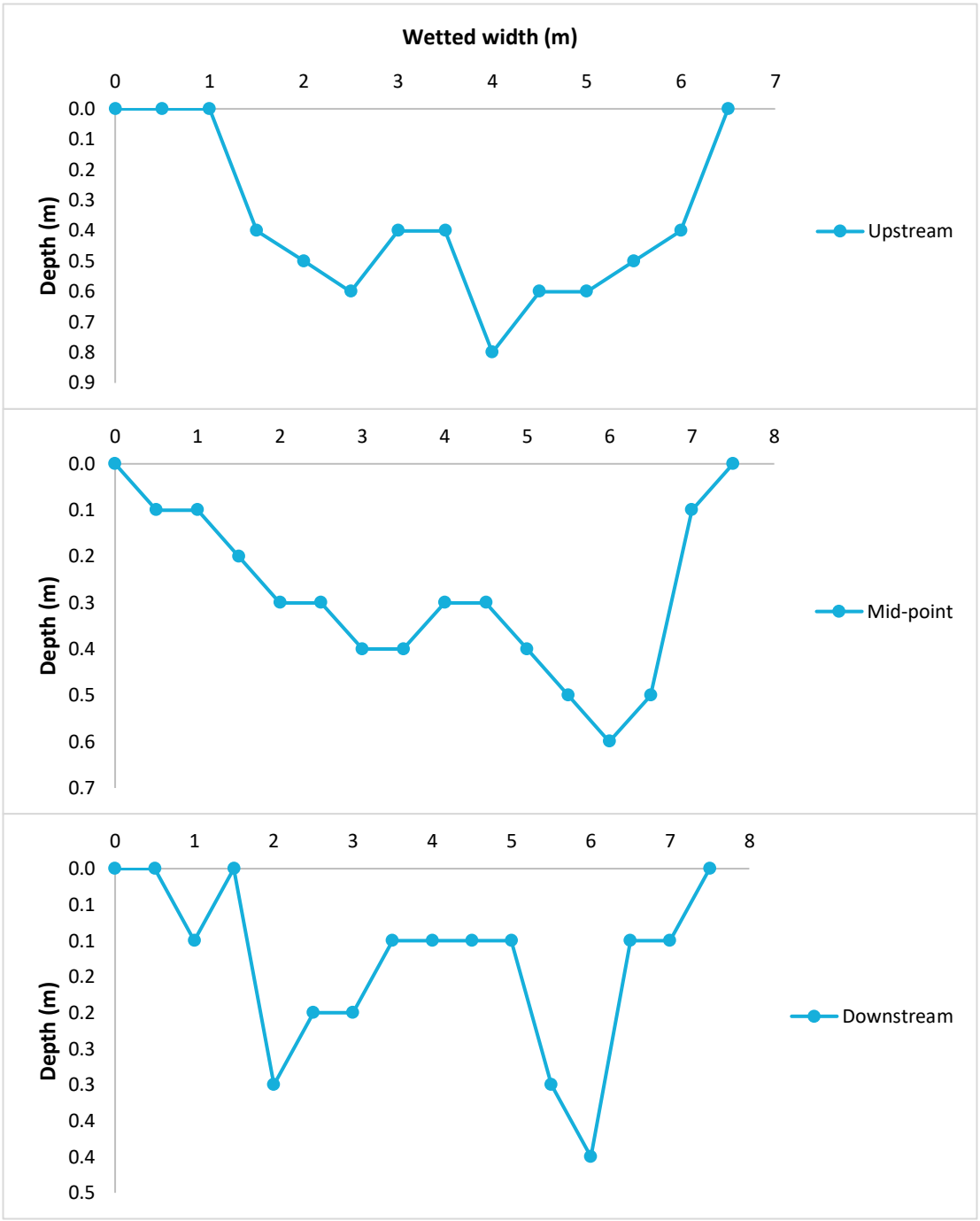


Figure B.4 Site SMC5 – channel depth profiles.

Table B.12 Site SMC5 – habitat assessment for MNES species.

MNES Species Habitat

Logs provide basking habitat

Sandy banks provide nesting habitat

Undercut banks provide habitat

Habitat	Present / Absent	Habitat	Present / Absent
Isolated pools	Absent	Individual log (diameter >250mm)	Present
Connected pools	Present	Individual branch (diameter <300mm)	Present
Riffle	Absent	Branch pile <50% dense (diameter <300mm)	Present
Run	Absent	Branch pile >50% dense (diameter <300mm)	Present
Aquatic vegetation	Absent	Log jam <50% dense (diameter >300mm)	Present
Turtle basking spots	Present	Log jam >50% dense (diameter >300mm)	Present
Turtle nesting habitat	Present	Terrestrial leaves and twigs	Present – dense
Submerged boulders / rock crevices	Present		

MNES Species Habitat	
Overall suitability	Potential for White-Throated Snapping turtle and Mary River turtle, potential suitable for juvenile Mary River cod and not suitable for Australian Lungfish.
Comments:	Shallow (<1 m) pools with submerged woody debris and rock faces and crevices were present that may provide some suitable habitat for juvenile Mary River cod, White-Throated Snapping turtle and Mary River turtle. Australian Lungfish habitat was not present. Some suitable foraging habitat for White-Throated Snapping turtles or Mary River turtles in flowing riffles but no deep foraging pools were present. However, protruding logs, woody debris and exposed rocks were present providing suitable basking spots for turtles.

Table B.13 Site SMC5 – Photographic monitoring.

Site SMC5

Upstream right bank at upstream site

Upstream at upstream site

Upstream left bank at upstream site

Upstream right bank at mid-site

Upstream at mid-site

Upstream left bank at mid-site

Upstream right bank at downstream site

Upstream at downstream site

Upstream left bank at downstream site