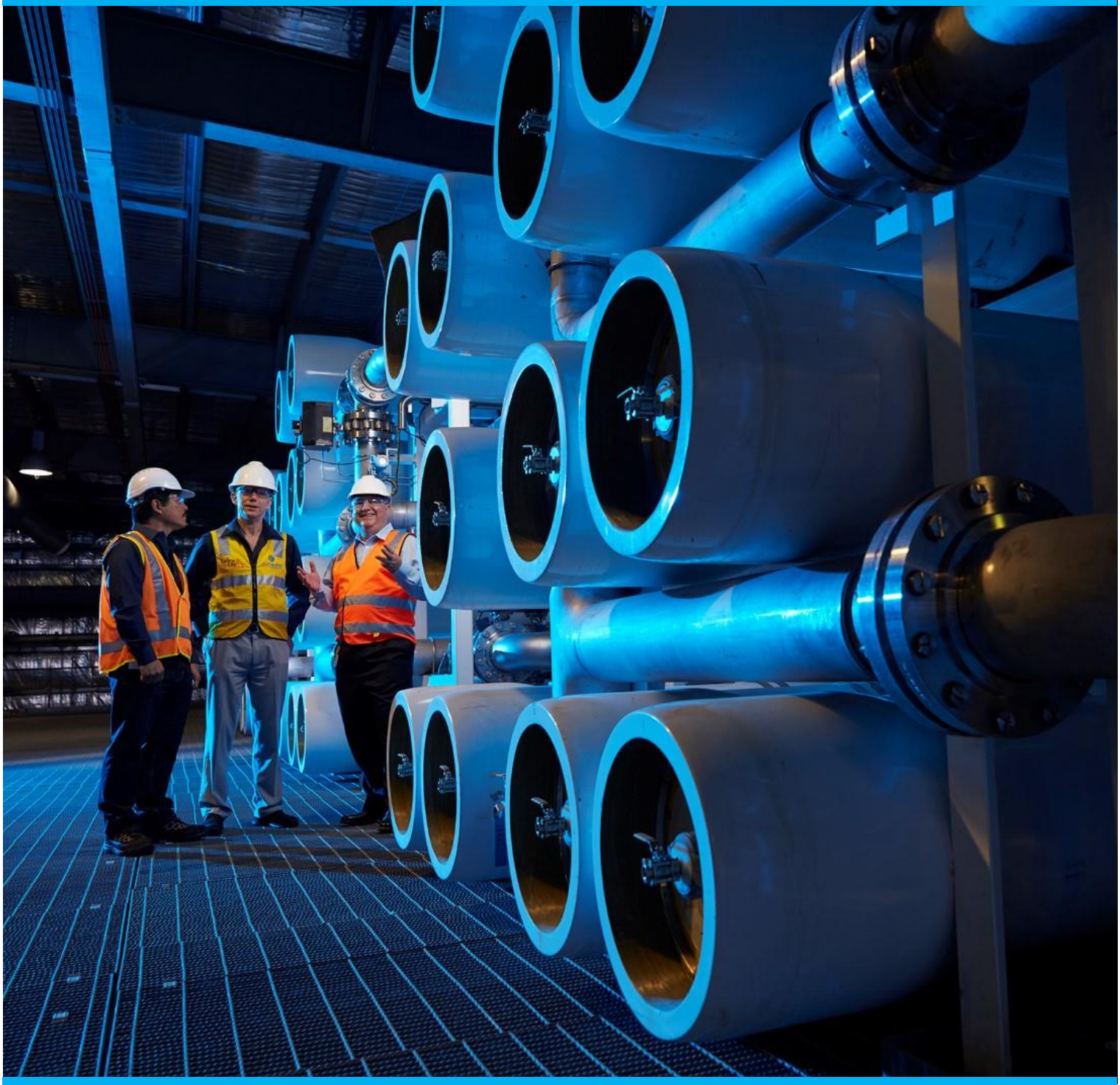
Annual Compliance Report
Northern Pipeline Interconnector 2
2021 - 2022



13 May 2022

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Distribution list

Name	Title
Department of Water, Agriculture and Environment	

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Executive Summary

This annual compliance report is the twelfth compliance report on Matters of National Environmental Significance (MNES) for the Northern Pipeline Interconnector Stage 2 (NPI2) and addresses the requirements of conditions applied to the project under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). This report addresses compliance with the conditions of approval between the 15 February 2021 and 15 February 2022 .

As the NPI2 project has transitioned from the construction and commissioning phases to the operational phase many conditions of approval have been closed out and new conditions of approval activated. During this reporting period (2021–2022) 12 conditions for the controlled action were active, whilst three remained inactive (EPBC 13, 14 and 17).

The conditions active during this reporting period (2021–2022) have been assessed for compliance. A summary of the results is presented in Table 1 and more detailed descriptions of the compliance assessment are presented in Sections 2.1 - 2.13.

The outcomes of the compliance assessment indicate no instances of any significant impact on EPBC Act listed species. Further, no incidents requiring notification to the Department of Agriculture, Water and the Environment (DAWE) have occurred during this reporting period (2021–2022). All ongoing active EPBC conditions of approval will continue to be implemented and audited 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*. The controlled action was assessed under the Bilateral Agreement and was approved subject to conditions on 12 February 2010 (EPBC 2007/3686) by the Minister for the former Department of the Environment, Water, Heritage and the Arts (DEWHA). The department has been subsequently renamed and is herein referred to as the Department of Agriculture, Water and the Environment (DAWE).

This report is the twelfth annual compliance report and demonstrates the NPI2 project's progress and compliance to the conditions within the 12 months (15 February 2021 - 15 February 2022) following the previous annual compliance reporting period (15 February 2020 - 15 February 2021).

The Southern Regional Water Pipeline Company Pty Ltd (trading as LinkWater Projects) was initially listed as the proponent for the controlled action. LinkWater Projects was established to be the Queensland Government's special purpose vehicle for the design and construction of bulk water pipelines and related infrastructure in South East Queensland. As of 30 June 2012, as part of a water sector reform by the Queensland government, LinkWater Projects ceased trading and its functions were taken over by the Queensland Bulk Water Transport Authority (trading as LinkWater). LinkWater assumed operational control over ongoing and new projects managed by LinkWater Projects. The NPI2 project infrastructure was handed over to LinkWater to operate and maintain following the completion of construction and commissioning activities in July 2012.

On 1 January 2013, with further reforms to the water sector by the Queensland government, the previously established Queensland Bulk Water Supply Authority (trading as Seqwater) merged with the former water entities: LinkWater and the SEQ Water Grid Manager. The trading name of Seqwater was retained and it is the primary Statutory Authority responsible for ensuring a safe, secure and reliable water supply across South East Queensland (SEQ). Seqwater also assumed ownership and operation of the NPI2 project that was owned and managed previously by LinkWater. Having assumed the functions and powers of LinkWater, Seqwater is therefore the proponent for NPI2 project and DAWE has been previously notified of this change to the proponent.

1.1 NPI2 Project Overview

The NPI2 forms part of the SEQ Water Grid and is a critical link in the bulk potable water delivery infrastructure for a reliable SEQ water supply. The NPI (Stages 1 and 2) can transport a volume of up to 65 Megalitres (ML) per day of treated potable water between reservoirs located in the Sunshine Coast and the Brisbane metropolitan area.

The SEQ water grid comprises the connection of key regional water supply sources by a series of bulk water transmission pipelines. These pipelines provide a framework to allow water to be transferred to where it is most needed and ultimately assist in providing long-term water security for the region.

As outlined in the NPI2 Environmental Impact Statement (EIS), the NPI2 project links the Noosa Water Treatment Plant (WTP) to the northern end of the previously completed Stage 1 pipeline at Eudlo. The project involved the construction of approximately 44 km of mainline pipeline plus approximately 4.3 km for the Noosa branch main. The NPI Stage 1 and 2 is designed to be a bi-directional flow pipeline allowing potable water to be transported in both a southern and northern direction between the North Pine WTP and Noosa WTP.

NPI Stage 2 was delivered by the Northern Network Alliance (NNA), an alliance consisting of KBR, Abigroup, McConnell Dowell and LinkWater Projects as the owner-participant. Following completion of construction, NPI

Stage 2 was transferred to LinkWater on 30 June 2012. On 1 January 2013, following restructure of water providers in South East Queensland, Seqwater became the owner of NPI2.

1.2 Project Progress

A brief overview of the Projects milestones completed to date is provided below:

- Construction started on the NPI2 project from 15 February 2010.
- Construction was completed on 17 November 2011.
- Commissioning works were completed and the NPI2 was handed over to LinkWater on 4 July 2012.
- The operational phase of the NPI2 began on 8 July 2012 and is ongoing.

2 Conditions of Compliance

To demonstrate compliance with the individual EPBC Act conditions of approval, Table 1 includes each condition number as per the controlled action approval notice of 12 February 2010. Conditions listed as not activated have not been addressed in this report. The status of the condition compliance is provided in Column 3 and Column 4 provides a summary of condition compliance with approval conditions. Further details of compliance status have been provided below this table. Please note that in some instances the conditions presented in Table 1 have been separated into lettered bullet points for ease of reference and the visual presentation of the conditions may differ to the determination notice.

Table 1: Reference Table for EPBC Act Controlled Action Conditions (February 2021– February 2022)

Column 1	Column 2	Column 3	Column 4
Condition:	**Condition/Requirement**	**Status**	**Compliance assessment**
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.	Noted – general obligation condition.	Compliant, with the exception of data collection from Coles Crossing, due to previous instrument failure. Further detail is provided in Sections 2.1 and 2.6, including actions currently being implemented by Seqwater to address this.
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.	Noted – general obligation condition. Conditions 24, 25, 26, 27, 29, 30 and 31 were closed out in previous reporting periods.	Compliant.
CG 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	Construction phase - Closed out in 2011-12 reporting period. Operational phase closed out after November 2015. Further detail on the Riparian Habitat Monitoring Program (RHMP) is provided below.	Compliant. The RHMP was submitted to DAWE on 15/05/14 for ministerial approval and was approved via letter on 12/08/14. Closed out as per RHMP Section 6.1 NPI2 – Operational Environmental

	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 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.		Management Plan (OEMP) approved by DAWE on 12/08/14.
CG 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.	Construction phase - Closed out in 2011-12 reporting period. Operational phase ongoing - An update on the AHMP is provided below.	Compliant. AHMP was submitted to DAWE on 15/05/2014 for ministerial approval and was approved via letter on 12/08/2014.
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	EPBC Condition 3 items a) – g) and i) were closed out in 2011-12 reporting period. EPBC Condition 3 item h) and j) are ongoing for operational phase. Item h) is closed out as –per RHMP Section 6.1 NPI2 – Operational Environmental Management Plan (OEMP) approved by DAWE on 12/08/2014.	Compliant. Refer to Conditions 28 and 32 of CG's Report (outlined in the rows above and detailed further in sections 2.3 and 2.4 below).

	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.		
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: (a) minimising impacts on all EPBC Act listed threatened species and communities and listed migratory	4a) and b) were closed out in the 2011-12 reporting period 4c) is ongoing for operational phase.	Compliant An updated EMP was submitted to DAWE on 15/05/2014 for ministerial approval and was approved via letter on 12/08/2014.

	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 NPI Stage 2.		
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.	Ongoing.	Compliant, with the exception of a component of Condition 4c(ii). Further detail is provided in Section 2.6, including actions currently being implemented by Seqwater to address this.
PBC 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.	Ongoing.	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.	Ongoing.	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.	Ongoing.	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.	Ongoing.	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.	Ongoing.	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.	Not activated.	N/A
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.	Not activated.	N/A
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.	Ongoing.	Compliant, except for data collection from Coles Crossing, due to previous instrument failure. Further detail is provided in Sections 2.1 and 2.6 An updated EMP was submitted to DAWE on 15/05/14 for ministerial approval and was approved on 18/08/14.
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.	Ongoing.	Compliant. This annual compliance report has been prepared and submitted to fulfil the requirement for the 2021-2022 reporting period.

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.	Not activated.	N/A

2.1 EPBC Condition 1

EPBC Condition 1 requirements are noted in Table 1. Evidence of compliance with this condition is provided within the annual compliance reports previously submitted to the DAWE. As previously reported, due to the previous failure of the in-stream instrument (flow Doppler) flow volume data and level data was unable to be collected via the in-stream instrument from Coles Crossing for the duration of the reporting period. Indicative flow volume data has been provided from the closest downstream hydrometric station (Dagun Pocket Alert Station) and this information has been utilised for the current reporting period. An Exo Sonde (*in-situ* instrument) was reinstalled at Coles Crossing in 2020 and has been used to collect water level data for the current reporting period. Refer to Section 2.6 for further detail on actions currently being implemented by Seqwater to address this issue.

EPBC Condition 1 Compliance Status – Compliant, with the exception of data collection from Coles Crossing due to previous instrument failure. As detailed in Section 2.6, Seqwater are continuing to ensure delivery of an interim monitoring and data collection program and have prioritised project work to commission the in-stream instrument as soon as possible. The interim measure has delivered data to enable an evaluation of operations to achieve the intent of the monitoring program.

2.2 EPBC Condition 2

EPBC Condition 2 Compliance Status – Compliance with the remaining activated conditions (28 and 32) is described in Sections 2.3 to 2.4 below.

2.3 QCG Condition 28

Although it is not anticipated the operation of the NPI2 will impact upon riparian habitats or EPBC Act listed species that utilise the riparian habitat, Seqwater commissioned the development of an operational riparian habitat monitoring program to establish the existing condition of riparian habitat along the Mary River at the Coles Crossing offtake and provide recommendations on future monitoring requirements.

The development of the operational RHMP consisted of a review of the construction based RHMP in order to identify previous commitments and requirements, a summary of which are;

- Document and analysis of previously collected data,
- Performance criteria,
- Mitigation measure response levels,
- Appropriate mitigation measures, and
- Riparian monitoring requirements.

After a comprehensive review it was determined that operation of NPI2 will have no impacts on the riparian habitats at sites where Giant Barred Frog have been recorded and hence no impacts on individuals. However,

it was recommended that monitoring of the Giant Barred Frog and its habitat was to continue yearly for two years (November 2014 and November 2015) and the RHMP was subsequently approved by DAWE in August 2014.

EPBC Condition 28 Compliance Status – Construction phase closed out in the reporting period (2011-2012). Operational phase is closed out for this reporting period (2021–2022).

2.4 QCG Condition 32

The development of the operational AHMP consisted of a review of the construction based AHMP in order to identify previous commitments and requirements which were;

- Baseline ecological monitoring to establish performance indicators and response levels;
- Document and analysis of baseline data;
- Performance criteria;
- Mitigation measure response levels;
- Appropriate mitigation measures; and
- Aquatic habitat monitoring requirements.

Based on the previously endorsed framework as outlined in the AHMP (construction), the program recommended for ongoing monitoring included five of the nine sites assessed in the baseline survey, and a rationalised survey method compared to that used initially. The recommended frequency of habitat monitoring is once each year, in October during low flow conditions.

One performance indicator is recommended for the operational phase of the NPI2 Project:

- Maximum extraction rate of 20 ML/day from the Coles Crossing off-take.

An assessment of the potential impacts to MNES species undertaken as part of the EIS (Linkwater Projects, Northern Pipeline Interconnector – Stage 2 Environmental Impact Statement, December 2008), which was based on extraction levels of up to 40 ML/day, found there would be no significant change to the frequency or duration of flows predicted for seasonally high and low flow periods for the Mary River. Currently, the Coles Crossing pump station infrastructure is only designed to take a maximum of 20 ML/day which is half of what was assessed for the EIS. If there are ever plans to increase the water extraction rate beyond 20 ML/day, via upgrading the pumping station infrastructure, the aquatic habitat monitoring program will need to be revised, noting that additional environmental approvals would be triggered by such an upgrade.

Annual assessment of aquatic habitat for the MNES species at the five sites will provide data against which the performance of this indicator in maintaining suitable aquatic habitat in the survey area can be assessed. The AHMP was approved by DAWE in August 2014.

EPBC Condition 32 Compliance Status – Construction phase closed out in reporting period 2011-2012. Operational phase is ongoing and compliant.

2.5 EPBC Condition 4

An updated Operational Environmental Management Plan (OEMP) outlining a procedure for recording the flow volumes and levels at the Coles Crossing pump station (referred to as the Coles Crossing offtake) and Home Park gauging station was developed and submitted. The updated OEMP was approved in August 2014.

EPBC Condition 4 Compliance Status – Compliant. Operational phase ongoing.

2.6 EPBC Condition 5

EPBC Condition 5 requires the data kept in accordance with Condition 4c be submitted to DAWE on an annual basis. This includes:

- *Condition 4c item i) requires the keeping of accurate records for the amount of water extracted from the Coles Crossing offtake.*
- *Condition 4c item ii) requires the keeping of accurate records for the instream flow volumes and levels at Coles Crossing offtake and Home Park gauging station.*
- *Condition 4c item iii) requires the amount of water transported through the NPI2 to be reported*

2.6.1 Water Extracted from Coles Crossing Pump Station (Condition 4c Item i)

During the reporting period (15 February 2021 - 15 February 2022) 2,141 ML of water was extracted from Coles Crossing offtake under the existing water extraction entitlement. This volume equates to approximately 32.9% of the annual extraction entitlement (6,500 ML). A summary of the monthly raw water extraction from Coles Crossing offtake is provided in Table 2. Daily extraction volumes can be provided to DAWE upon request.

Table 2: Raw water extraction at Coles Crossing offtake

Month	Monthly Extraction Volume (ML)	Percentage of Total Allocation (6500ML/year)
February 2021*	76	1.2 %
March 2021	298	4.6 %
April 2021	37	0.6 %
May 2021	116	1.8 %
June 2021	83	1.3 %
July 2021	98	1.5 %
August 2021	70	1.1 %
September 2021	218	3.4 %
October 2021	114	1.8 %
November 2021	466	7.2 %
December 2021	330	5.1 %
January 2022	168	2.6 %
February 2022*	67	1.0 %
TOTAL	**2,141**	**32.9 %**

**Extraction volumes are calculated from 15 February 2021 to 15 February 2022 to align with the reporting period.*

2.6.2 Water Levels at Coles Crossing Offtake (Condition 4c Item ii)

Due to failure of the acoustic Doppler (the *in-situ* instrument that measures flow volume and water level) at Coles Crossing (reported in the 2019-2020 annual compliance report) river level data is not available from Coles Crossing for the duration of the current reporting period.

Following the failure of the acoustic Doppler in 2020 Seqwater initiated a project to reinstate and relocate the Doppler to a more suitable location to improve data reliability and accessibility for data download and maintenance of the instrument. The scope of the project also included the installation of a connection to a temporary telemetry station to enable remote data monitoring. The delivery of this project was initially delayed due to reprioritisation of Seqwater's capital expenditure. In March 2021 the project was delivered by a Contractor

however the commissioning was deemed as unsatisfactory due to unsuitable location (potential interference from nearby stormwater inflow), inadequate protection against high flows and incomplete installation.

Seqwater initiated another project to reinstate the equipment after further investigation on the most appropriate location and methodology to secure the equipment. The scope of this project was expanded to include the installation of a permanent telemetry station and a level differential pressure sensor. The level differential pressure sensor will provide both flood warning and backup water level data, should it be required. This project mobilised mid-December 2021 and the initial phase of the project has been completed including the installation of solar panels, switchboards and instrument cabinets and associated data cables, flood marker posts and footing for the instrument mounting. The second phase of the project (which included the installation of instream infrastructure) could not be scheduled until there was a period of favourable weather and flow conditions. The project was remobilised on 14 February 2022.

In late-February the Gympie region experienced significant rainfall with a total of 827.8mm of rain from 23 February 2022 to 27 February 2022. Floodwaters inundated the project area with a nearby monitoring station indicating the area was approximately ten metres underwater during this event. This flooding event and subsequent high flows in the catchment caused significant erosion and damage from debris and fallen vegetation which prevented safe access to site. The site remained submerged / partially submerged until late-March 2022. The majority of equipment from the initial phase of the project remained onsite and undamaged with the exception of the specialised data cables. Seqwater engaged a contractor to conduct a geotechnical assessment on 28 April 2022 due to local landslips and site safety concerns. Flooding occurred again on 7 May 2022 and the site was partially inundated again. Site cleanup was completed and the access track was restored on 8 May 2022. The Doppler has been installed on site (in non-working condition) and will be commissioned as soon as practical following project completion.

Figure 1 & 2: Mary River flooding 23 February 2022 (left) and flooding on 8 May 2022 (right)

As previously stated in the 2020-2021 annual compliance report, interim measurements have been implemented to achieve the intent of EPBC Condition 5. Water level data for Coles Crossing offtake has been continually measured (hourly) using an in-situ water quality instrumentation (Exo Sonde). Although water level data collected through the Exo Sonde is not as accurate as data collected through a hydrometric instrument the data has been analysed and adjusted based on historical bathymetric survey data. Figure 3 demonstrates the comparison of the adjusted water level data from the Exo Sonde and data from the closest hydrometric station which is Dagun Pocket Alert Station (8.5km downstream of Coles Crossing). This comparison supports that the close statistical alignment between the adjusted Exo Sonde and Dagun Pocket – although it should be noted that the Mary River at Dagun Pocket is much wider than at Coles Crossing.

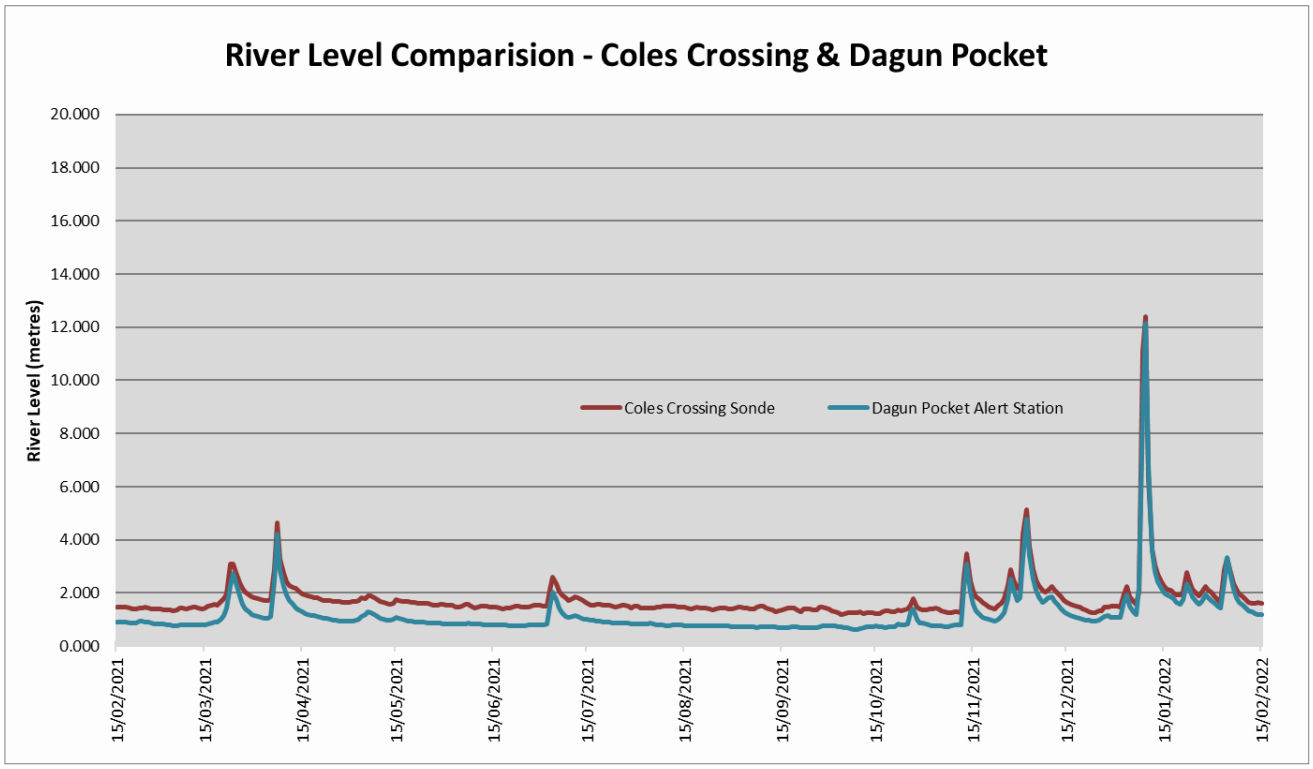

Figure 3: Comparison of river level data between Coles Crossing sonde data and Dagun Pocket

2.6.3 Flow Volumes at Coles Crossing Offtake (Condition 4c Item ii)

Due to failure of the acoustic Doppler (the in-situ instrument that measures flow volume and water level) at Coles Crossing (reported in the 2019-2020 annual compliance report) flow volume data is not available from Coles Crossing for the duration of the current reporting period.

Data from the Dagun Pocket Alert Station has also been used to provide indicative flow volumes in the Mary River. The section of the Mary River between Coles Crossing and Dagun Pocket receives input from Kandanga Creek and a number of non-perennial waterways. It is likely that there are also abstractions from this section of the river given adjacent land uses (e.g. small-scale mining, forestry, horticulture). Therefore, flow data from Dagun Pocket has been provided as indicative only. Raw water flows past Dagun Pocket have been provided in Table 3. During the reporting period a total of 554,430 ML of downstream water flow has been recorded at the Dagun Pocket station. Daily flow volumes can be provided to DAWE upon request.

Table 3: Monthly flows past the Dagun Pocket Alert Station

Month	Flows past Dagun Pocket (ML)	Average flows / day for each month at Dagun Pocket (ML/d)
February 2021	2,961	212
March 2021	26,328	849
April 2021	48,373	1,612
May 2021	10,395	335
June 2021	4,297	143
July 2021	15,119	488
August 2021	3,778	122
September 2021	2,487	83
October 2021	5,019	162

November 2021	38,201	1,273
December 2021	69,537	2,243
January 2022	290,538	9,372
February 2022	37,396	2,493
TOTAL	**554,430**	

Daily flow data from Dagun Pocket and the corresponding river height at Coles crossing has also been illustrated in in Figure 4 below.

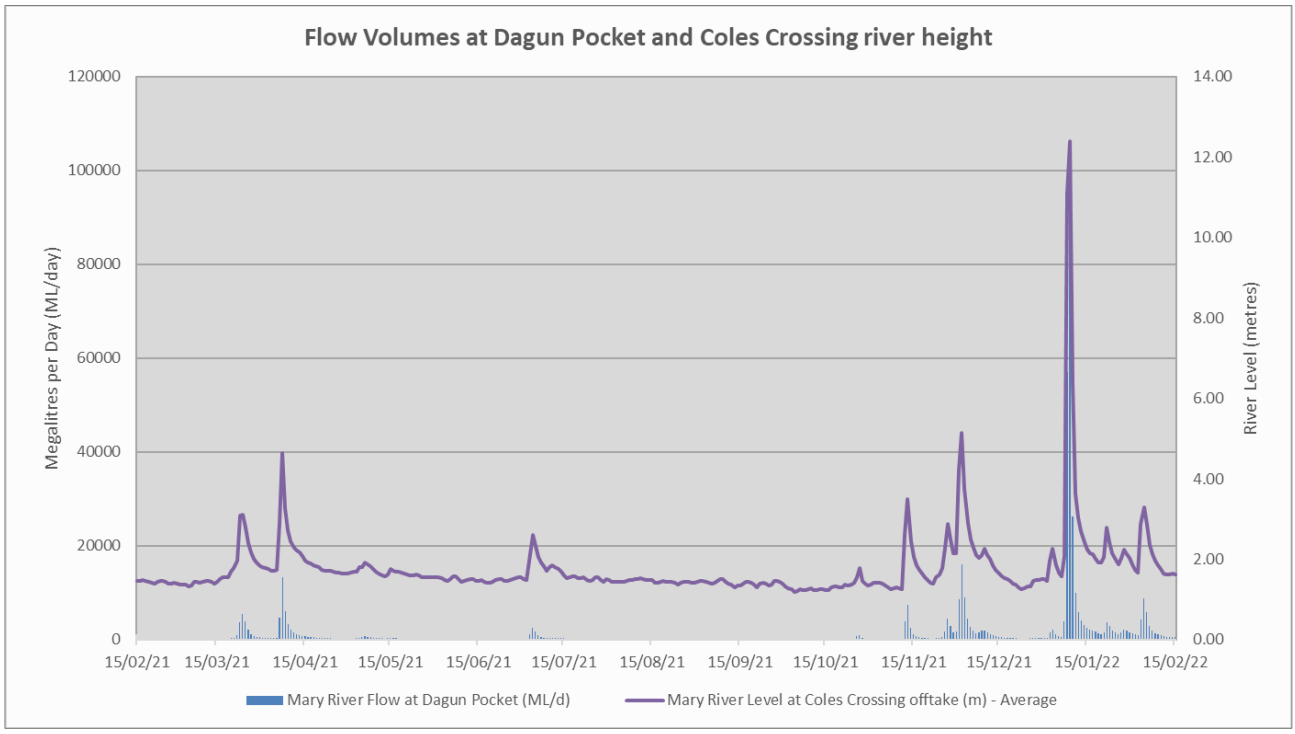

Figure 4: Mary River flow volumes at Dagun Pocket and Coles Crossing river height

2.6.4 Mary River Home Park Gauging Station (Condition 4c Item ii)

Flow volumes and levels at the Home Park gauging station (station number 138014A) are recorded on a daily basis by the Department of Regional Development, Manufacturing and Water (DRDMW) and summarised for the current reporting period in **Error! Reference source not found.** and Figure 5 below. Home Park gauging station data is publicly available on the DRDMW Water Monitoring Website.

Table 4 : Monthly flows past the Home Park Gauging Station

Month	Total flows at Home Park (ML)	Average daily flows at Home Park (ML/d)	Average River Level at Home Park (metres)
February 2021	2,306	165	1.25
March 2021	70,806	2,284	1.70
April 2021	88,427	2,948	1.99
May 2021	18,312	591	1.51
June 2021	4,992	166	1.24
July 2021	26,510	855	1.57
August 2021	3,927	127	1.20
September 2021	1,283	43	1.07

October 2021	26,427	852	1.35
November 2021	215,963	7,199	2.44
December 2021	240,511	7,758	2.60
January 2022	2,488,753	80,282	5.24
February 2022	173,542	11,569	3.01
TOTAL	3,361,760	114,840	

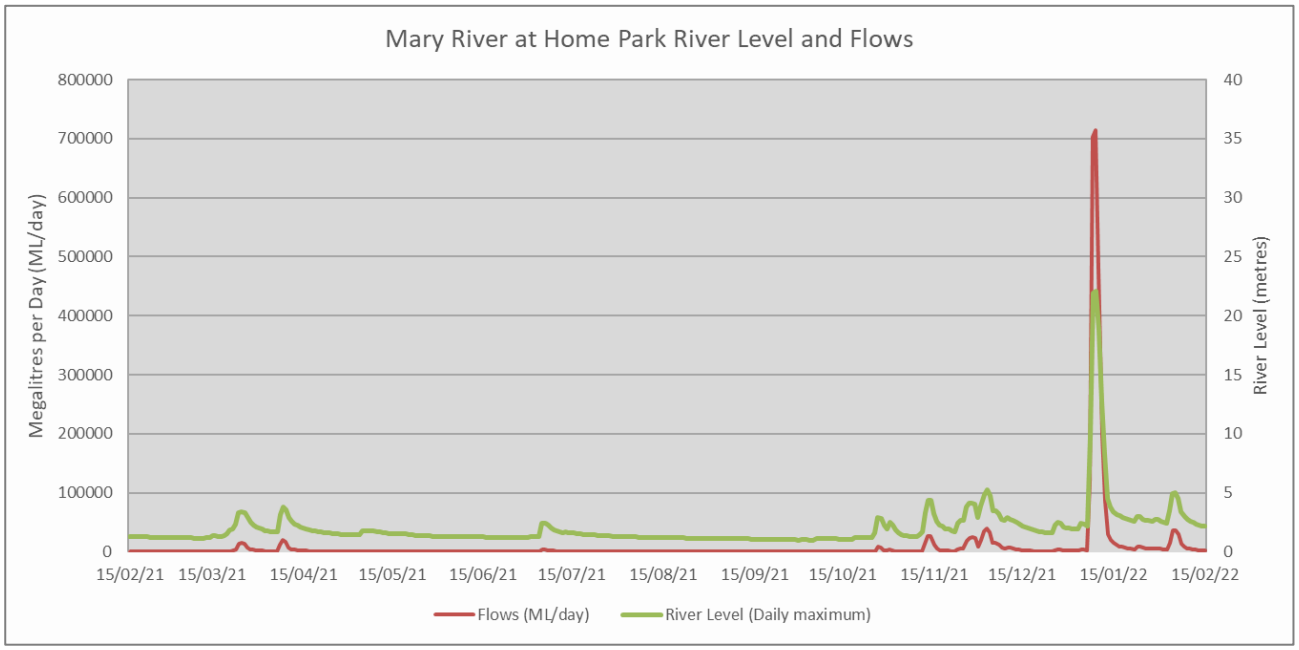

Figure 5: Flow volumes and levels at Home Park gauging station

2.6.5 Water Transported through NPI2 (Condition 4c Item iii)

Table 5 provides a summary of water transport volumes via the NPI2. During this reporting period Seqwater transported approximately 774 ML of potable water from the Noosa WTP through the NPI2 and 1,874 ML of potable water was supplied to the Noosa Zone via NPI2 from other grid connected assets not related to extraction from the Coles Crossing offtake. Daily transfer volumes can be provided to DAWE upon request.

Table 5: Amount of water transport through the NPI Stage 2

Month	Northern Flow "Import to Noosa Zone" (ML)	Southern Flow* "Export from Noosa Zone" (ML)
February 2021	0	49
March 2021	76	49
April 2021	212	0
May 2021	306	0
June 2021	289	0
July 2021	287	0
August 2021	258	0
September 2021	55	119
October 2021	78	44
November 2021	8	332

December 2021	113	181
January 2022	191	0
February 2022	0	0
TOTAL	**1,874**	**774**

**Note "Southern Flow" is the southern transport from the Noosa WTP into NPI2*

EPBC Condition 5 Compliance Status – Operation remained compliant with Conditions 4c(i) and 4c(iii) of the condition. Due to previous failure of the in-stream instrument, operation was not strictly compliant with Condition 4c(ii) of the condition. As detailed above, Seqwater has ensured delivery of an interim monitoring and data collection program and have prioritised project work to commission the in-stream instrument as soon as practicable. The interim measure has provided indicative water level data for this reporting period from an Exo Sonde installed at Coles Crossing offtake, and indicative flow data for this reporting period from an alternate location (Dagun Pocket alert station), downstream on the Mary River. The interim measure has delivered data to enable an evaluation of operations to achieve the intent of the monitoring program.

2.7 EPBC Condition 7

EPBC Condition 7 requires revised plans or programs to be approved by the Minister prior to implementation of the new plan or program.

EPBC Condition 7 Compliance Status – This condition has been complied with and requires no further action.

2.8 EPBC Condition 9

EPBC Condition 9 requires the transport of water through the NPI Stage 2 to be carried out in accordance in the following order of preference:

- ***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 above 20 ML/day; or otherwise*
- ***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 6,500 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)

During the following time periods 1st Preference extraction was initiated for raw water supply to Noosa WTP and water was harvested from the Mary River main channel at the Coles Crossing:

- 15 February 2021 – 02 March 2021
- 23 March 2021 – 25 April 2021
- 06 July 2021 – 29 July 2021 and
- 10 November 2021 – 15 February 2022

Controlled releases from Borumba Dam were not required during these periods as the dam was spilling or there was sufficient flow with run of river). During these time periods the flows at Coles Crossing Offtake (indicative flow from Dagun Pocket) were above 90 ML/day and flows at Home Park gauging station were above 20 ML/day. Mary River flows during these periods have been illustrated in Figure 6 - 9 below.

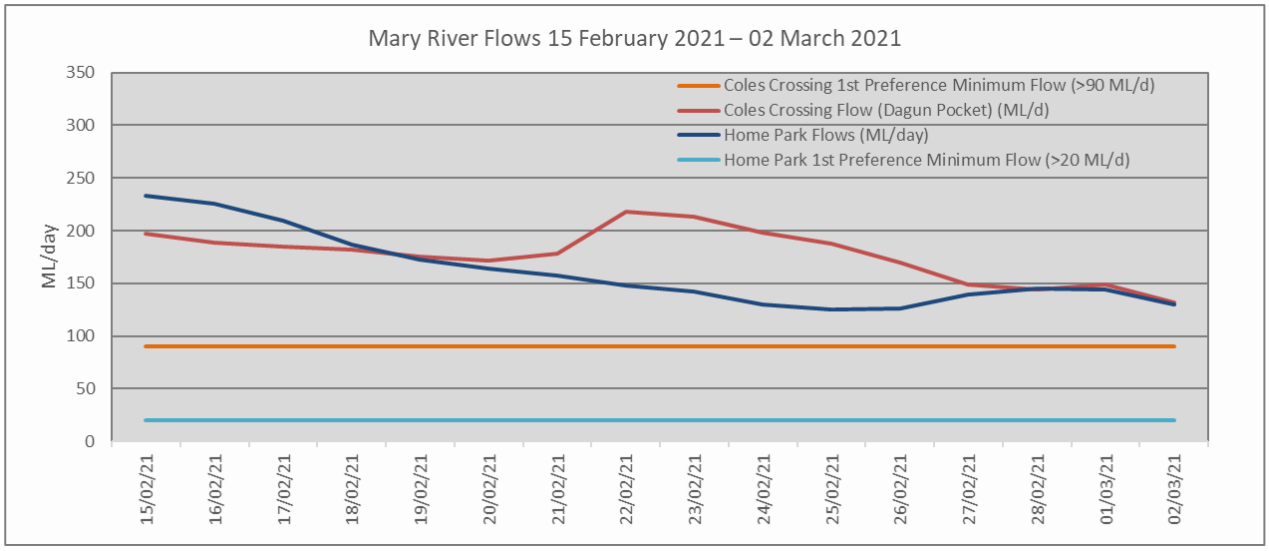

Figure 6 – Mary River Flows during 15 February 2021 – 02 March 2021

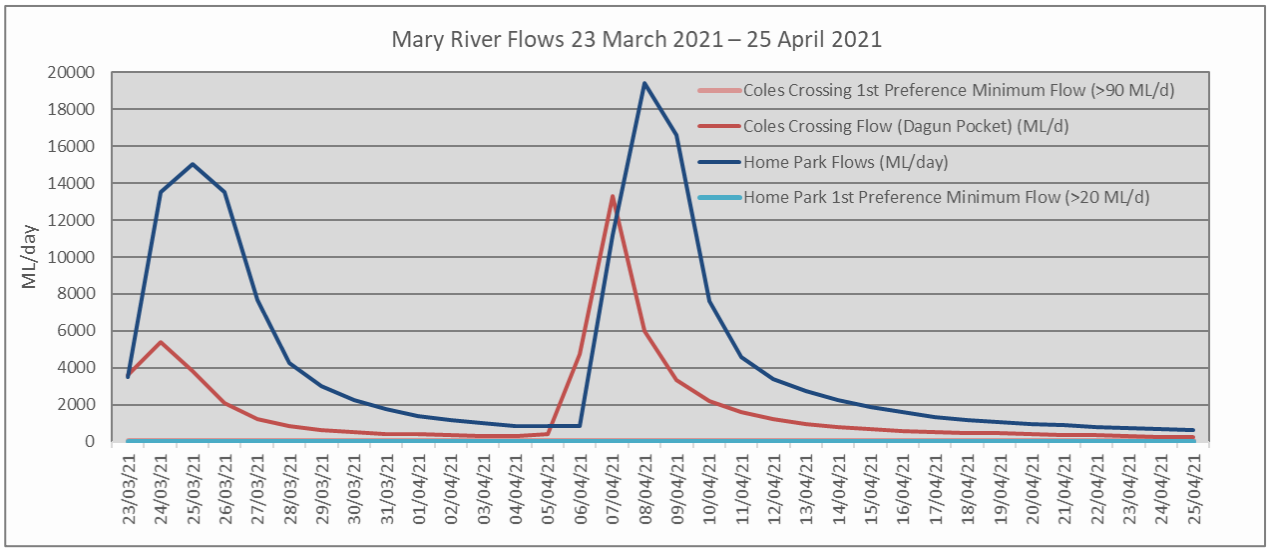

Figure 7 – Mary River Flows during 23 March 2021 – 25 April 2021

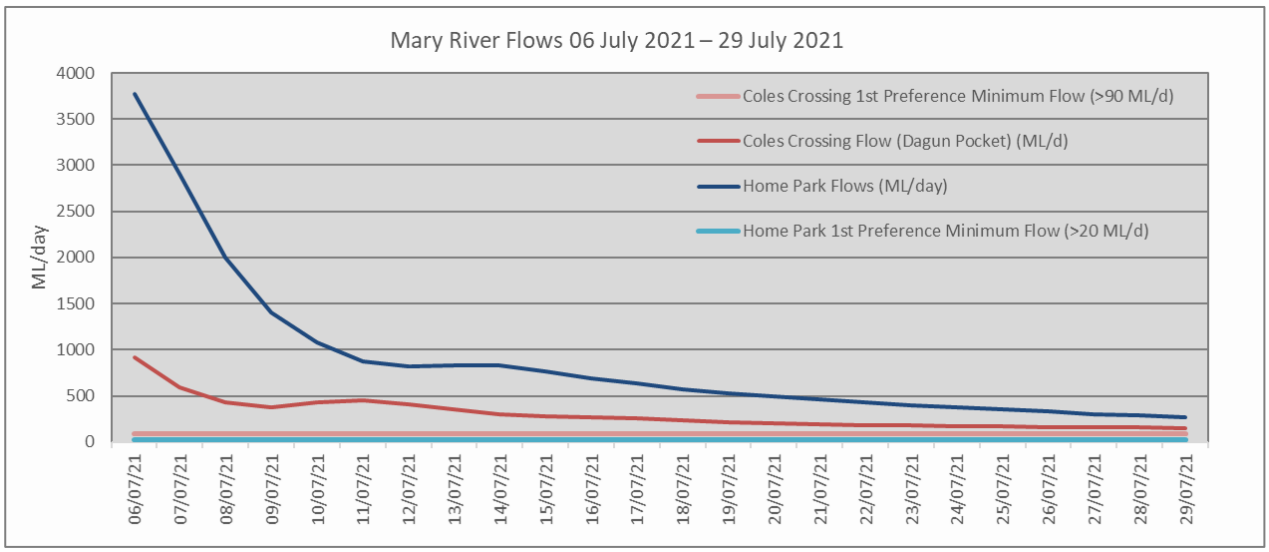

Figure 8 – Mary River Flows during 06 July 2021 – 29 July 2021

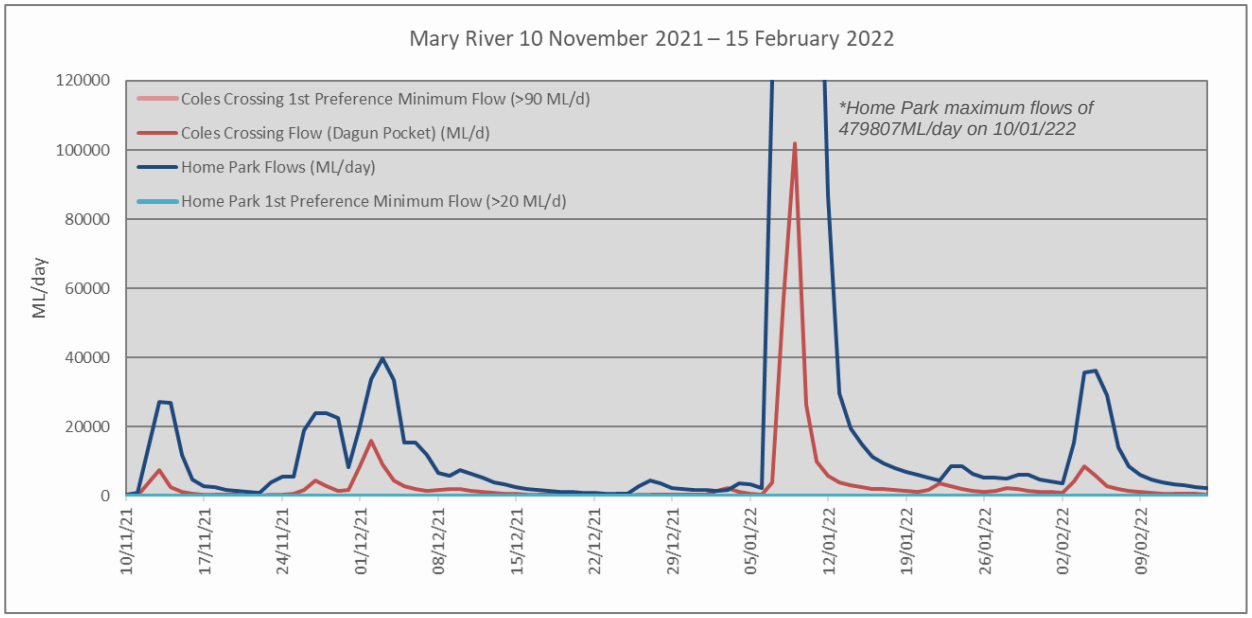

Figure 9 – Mary River Flows during 10 November 2021 – 15 February 2022

2.8.2 Controlled Releases from Borumba Dam (2nd Preference)

Controlled releases of water made from Borumba Dam throughout the current reporting period totaled approximately 3,743 ML. Table 6 provides a monthly summary of the Borumba Dam releases. Daily release volumes can be provided to DAWE upon request.

Table 6: Borumba Dam Controlled Releases

Month	Controlled Releases from Borumba (ML)
February 2021	0
March 2021	305
April 2021	53
May 2021	331
June 2021	279
July 2021	57
August 2021	313
September 2021	1,429
October 2021	892
November 2021	85
December 2021	0
January 2022	0
February 2022	0
TOTAL	**3,743**

Controlled releases from Borumba Dam occurred continuously during the following time periods:

- 03 March 2021 – 22 March 2021
- 26 April 2021 – 05 July 2021 and
- 30 July 2021 – 09 November 2021

Controlled releases during these periods were primarily undertaken for the purposes of supplying water to high priority users downstream including irrigation customers and Gympie Regional Council. Between the 25/09/2021 – 6/10/2021 Home Park gauging station recorded flows below 20 ML/d and between the 24/08/2021 – 7/11/2021 Coles Crossing periodically received flows below 90 ML/d. During these times releases from Borumba Dam were occuring in accordance with EPBC Condition 9. Mary River flows during these periods have been illustrated in Figure 10 - 12 below.

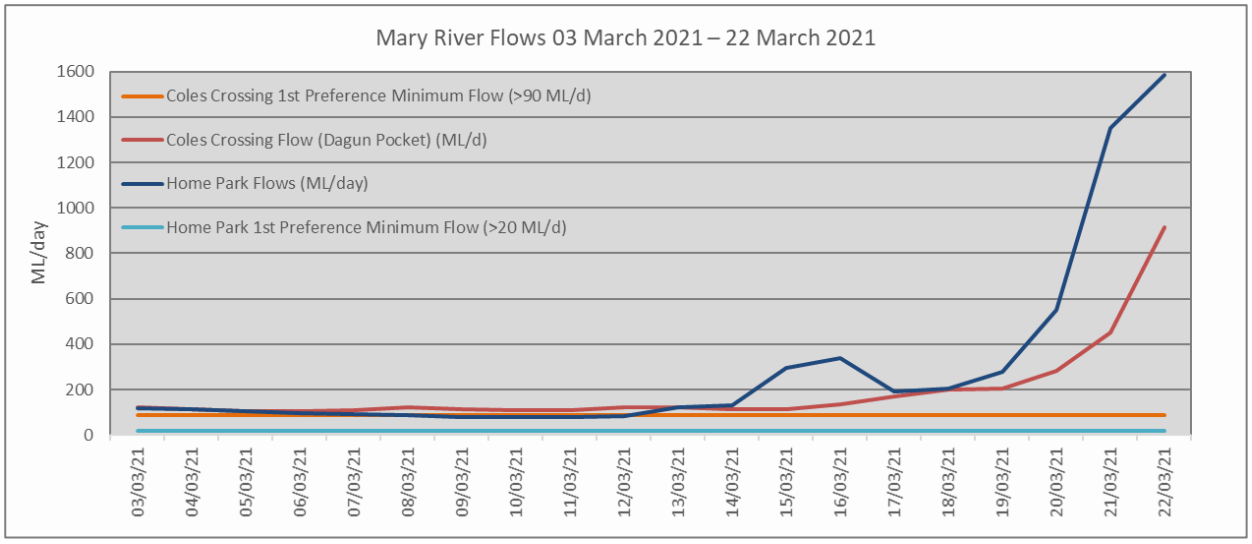

Figure 10 – Mary River Flows during 03 March 2021 – 22 March 2021

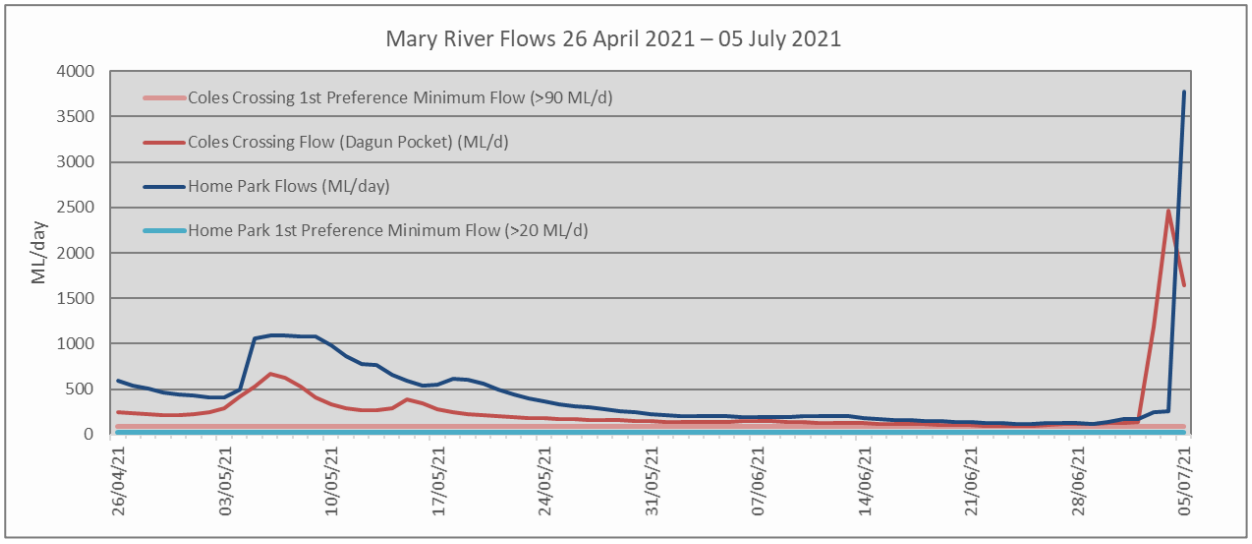

Figure 11 – Mary River Flows during 26 April 2021 – 05 July 2021

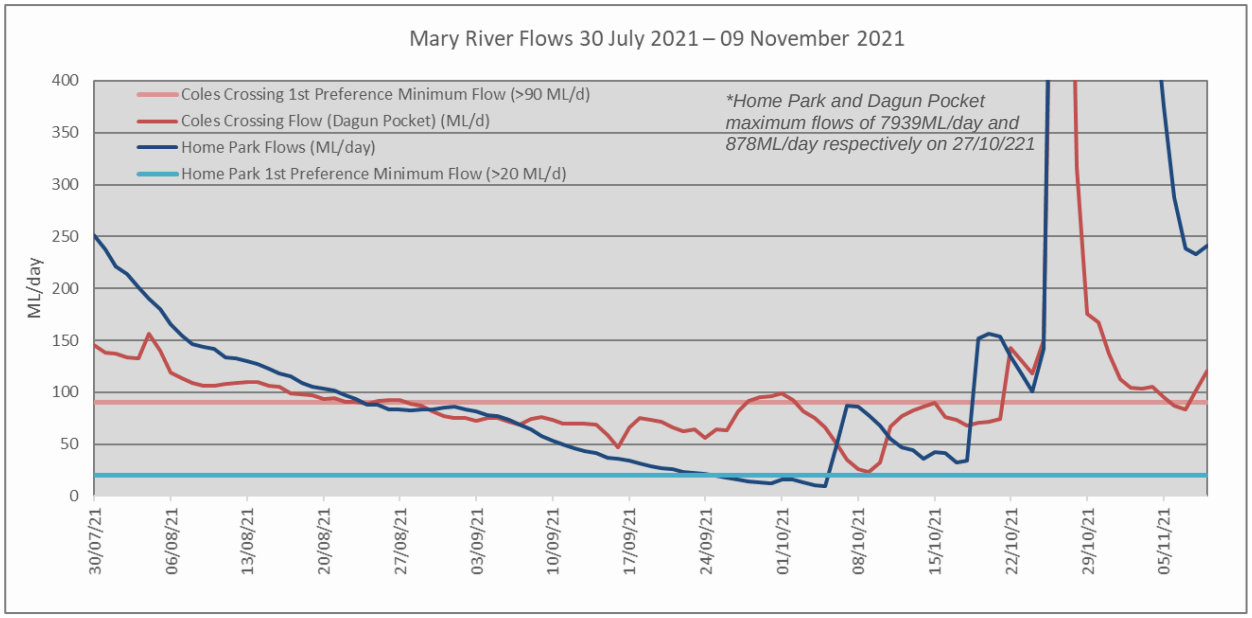

Figure 12 – Mary River Flows during 30 July 2021 – 09 November 2021

EPBC Condition 9 Compliance Status – Compliant with approval conditions.

2.9 EPBC Condition 10

During the reporting period (15 February 2021 - 15 February 2022) 2,141 ML of water was extracted from Coles Crossing offtake under the existing water extraction entitlement. This volume equates to approximately 32.9% of the annual extraction entitlement (6,500 ML). Refer to Table 2 for monthly extraction volumes. Furthermore, the current extraction and transportation capacity of the Coles Crossing pump station is 20 ML per day, therefore physically limiting daily extraction volumes to 20 ML.

EPBC Condition 10 Compliance Status – Compliant with approval condition.

2.10 EPBC Condition 11

There were no State water licences issued for the purposes of operation of NPI2.

EPBC Condition 11 Compliance Status – Compliant with approval condition.

2.11 EPBC Condition 12

As this report meets the need for lodgement of a statement of compliance under EPBC Condition 11 it also meets the requirements for EPBC Condition 12.

EPBC Condition 12 Compliance Status – Compliant with approval condition.

2.12 EPBC Condition 15

Seqwater is committed to maintaining accurate records required under the active conditions of approval pertaining to the operation of NPI2. Records of activities associated or relevant to the conditions of approval, beyond what has been presented within this report can be made available to the Department upon request.

Records of all activities associated or relevant to the EPBC Conditions of approval have been maintained with the exception of flow volume records from Coles Crossing (refer to Section 2.6 for further details).

EPBC Condition 15 Compliance Status – Compliant, except for the inability to collect flow volume from Coles Crossing for the duration of the reporting period. As discussed in section 2.6 the interim measure has delivered data to enable an evaluation of operations to achieve the intent of the monitoring program.

2.13 EPBC Condition 16

This report meets the need for lodgement of annual compliance reports for the NPI Stage 2 project and therefore meets the requirements for EPBC Condition 16.

EPBC Condition 16 Compliance Status – Compliant with approval condition.

3 Conclusion

The pipeline and associated facilities for the NPI2 have been operational during this reporting period. Seqwater is not aware of any events that have occurred during this reporting period that had the potential to significantly impact EPBC Act listed species or MNES. No incidents requiring notification to DAWE during this reporting period.

Seqwater will continue to submit annual compliance reports to DAWE for the remaining active EPBC Conditions. The required monitoring of aquatic MNES species associated with the AHMP will continue whilst the monitoring of MNES species associated with the RHMP is closed out for the operational phase of the project.

Seqwater will continue to progress the project to reinstate the Doppler and resume flow and level measurement at Coles Crossing. After commissioning, routine maintenance of the Doppler will be scheduled at monthly intervals to ensure the integrity of the equipment and associated monitoring data. The installation of the permanent telemetry station will improve data reliability and to minimise the risk of data gaps. The remote monitoring software will be configured to provide alerts to notify of anomalies in telemeted data which will trigger investigation and maintenance (where required). The level differential pressure sensor will also provide flood warning as well as backup water level data. During this reporting period an in-situ Exo Sonde has provided indicative water level data to enable an evaluation of operations to achieve the intent of the monitoring program.

The comparison between water level data from the Coles Crossing adjusted Exo Sonde data and the Dagun Pocket Alert Station demonstrated general consistencies with water level. However, the flow data from the Dagun Pocket Alert Station is only indicative of flows at Coles Crossing due to inflows from Kandanga Creek and a number of non-perennial waterways upstream of Dagun Pocket. In addition there are notable differences in stream profile between the two localities which is likely to contribute to varying flow data. Flow data from Dagun Pocket Alert Station and level data from the Coles Crossing Exo Sonde has been used to demonstrate continued compliance with the EPBC Act conditions of approval. Seqwater is committed to continuous improvement and to preventing and minimising potential impact to the environmental values on and surrounding Seqwater's facilities and assets.

Appendix A – Aquatic Habitat Monitoring Program (AHMP)

Northern Pipeline Interconnector Stage 2 Project

Aquatic Habitat Monitoring Program Operational Phase 2021 Survey

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freshwater estuarine marine

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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 18 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 eighth survey during operation of the NPI stage 2 (October 2020), 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 201, October 2019 and October 2020. 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 2021, as in previous surveys, there was 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. While Australian lungfish are occasionally recorded from Six Mile Creek, the habitat in Six Mile Creek is not their preferred habitat, and thus an important population of Australian lungfish is very unlikely to occur in Six Mile Creek (frc environmental 2018). Similarly, while there are favourable habitat elements for Mary River turtle and white-throated snapping turtle, these species have not been recorded from Six Mile Creek, and these species would occur only in low abundance, if at all, in Six Mile Creek (frc environmental 2018). The presence of mainly shallow pools in Six Mile Creek suggested that deeper habitat preferred by adult Mary River cod was limited, although the shallower pools likely support juvenile and intermediate sized cod. However, gauging station data indicated a relatively stable depth of approximately 1.5 – 2.0 m at the gauging station site in 2021 suggesting other reaches of Six Mile Creek likely support

habitat suitable for adult Mary River cod. The gauging station data indicates that the dominant water depth has constantly been in the range of 1.5 – 2.0 m since 2013. The overall suitability of habitat for MNES species in the Mary River and Six Mile Creek is unchanged compared to the survey in October 2020.

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 18 ML/day of potable water to NPI Stage 2.

The Noosa WTP has a maximum design capacity of 45 ML/day. It 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 18 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 18 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 eighth survey during operation of the NPI stage 2 (October 2021), 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 and October 2021. 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). 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 1). Lake Macdonald is in the upper reaches of Six Mile Creek.

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

2 Methods

2.1 Survey Timing

The survey was completed on 6 and 7 October 2021.

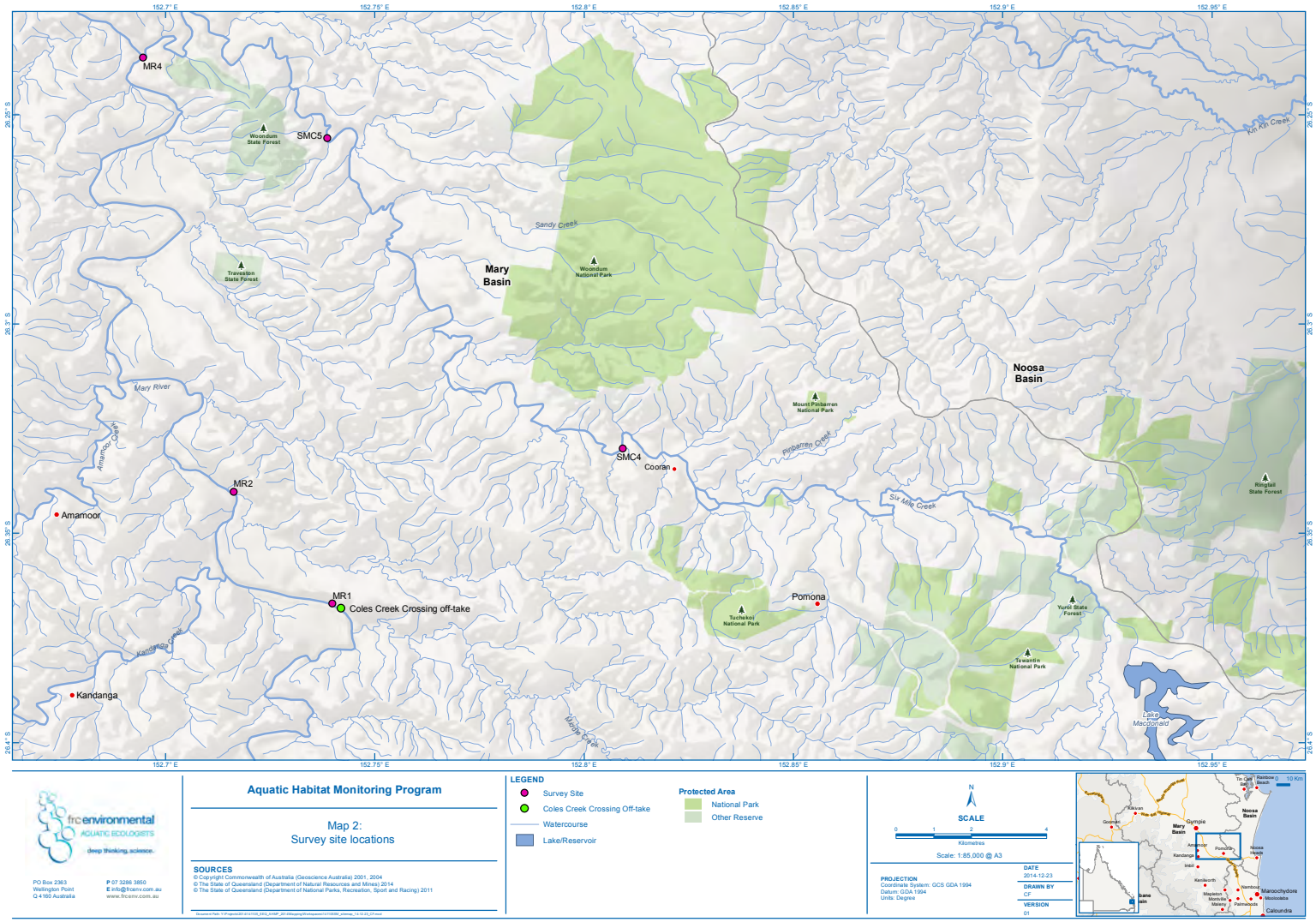
2.2 Site Details

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



Map 2.1 Survey Site Locations.

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. Smartroll 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 in early to mid-October 2021, prior to the survey, and some rainfall immediately before the survey (Figure 3.1). There were three relatively large rainfall events (i.e. > 30 mm) in the upper catchment in the 12 months prior to the survey: October 2020, December 2020, and February 2021. However, 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 and December 2020, January, March and July 2021 at Kenilworth, and
- October and December 2020, March and July 2021 at Gympie.

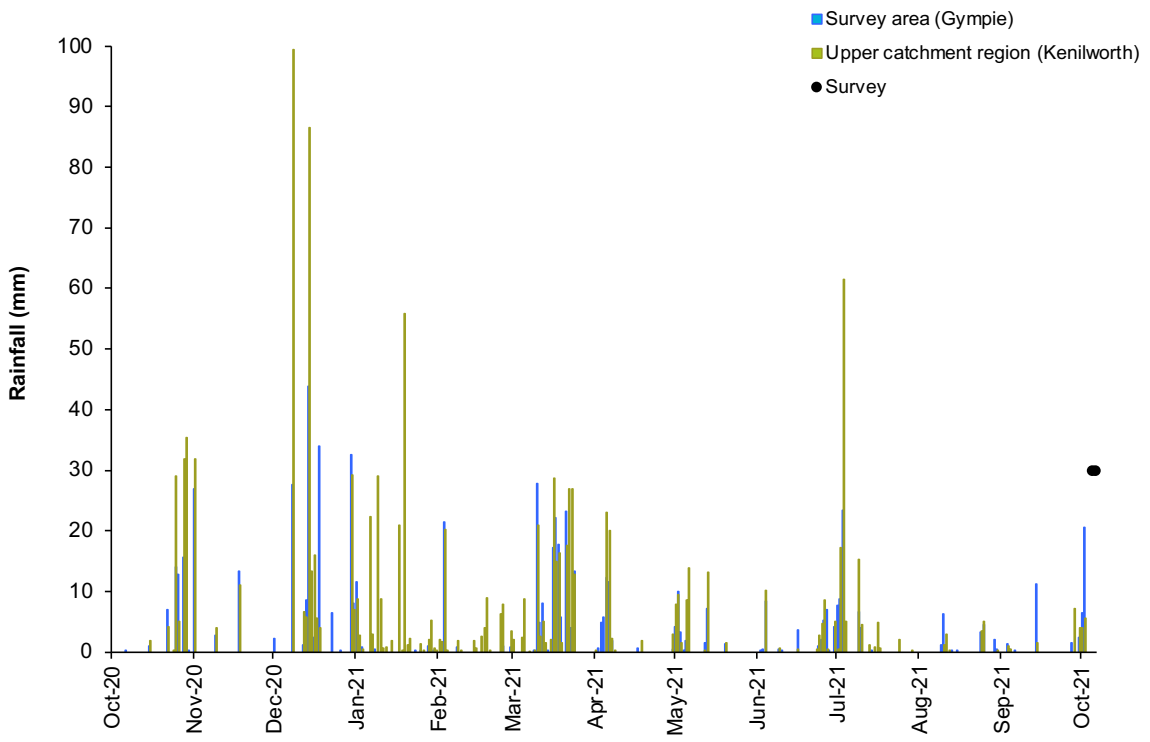


Figure 3.1 Total daily rainfall twelve months prior to the October 2021 survey in the survey area (Gympie) and upper catchment (Kenilworth).

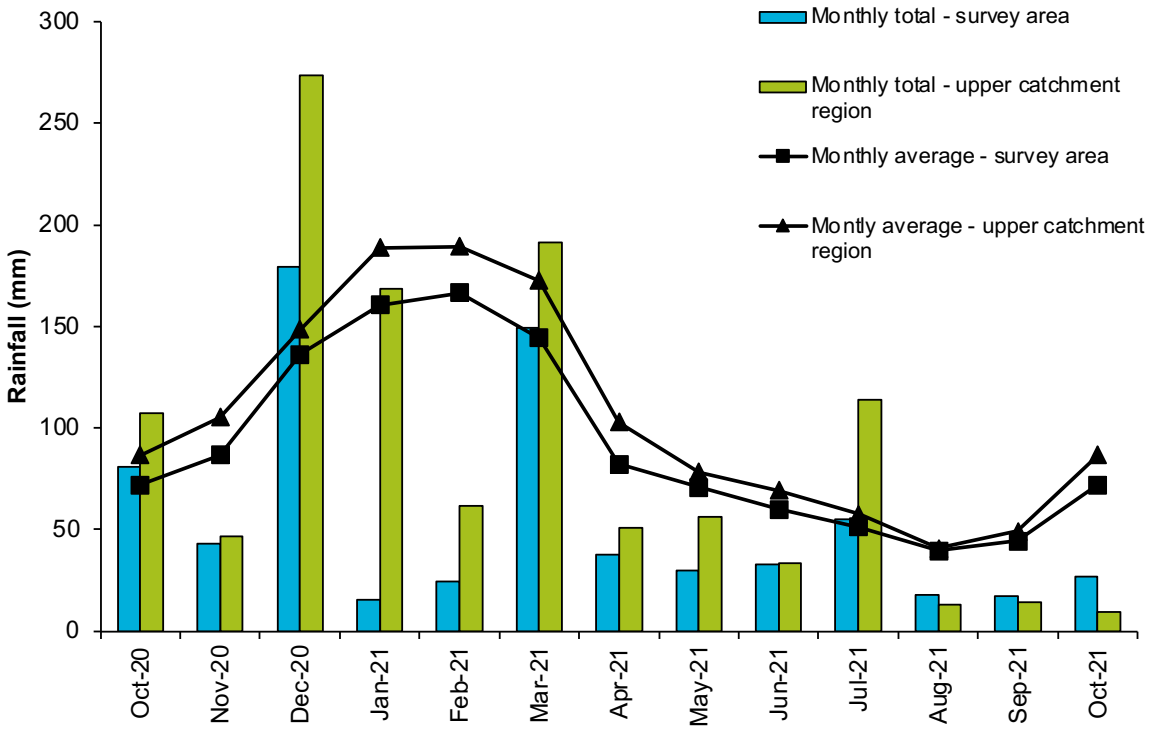


Figure 3.2 Total monthly rainfall for twelve months prior to the 2021 survey and long term mean rainfall for each month in the survey area (Gympie) and the upper catchment region (Kenilworth).

Flow and water levels in the Mary River and Six Mile Creek were generally low, except in December 2020, January, March, April and July 2021 where there were brief high flow events (Figure 3.3 and Figure 3.4). In the Mary River in 2021, the maximum recorded high flow event (i.e. 13,967 ML/day in April 2021) was of lower magnitude than recorded in the previous year (i.e. 2020) and was similar to the maximum flow events in 2016 (i.e. ~ 14,000 ML/day). Mary River maximum flows of a much higher magnitude were recorded in 2014, 2017 and 2018 (i.e. 50 000 to 60 000 ML/day), with maximum flows recorded in 2013 and 2015 being significantly larger again (i.e. ~380 000 ML/day in 2013; and ~200 000 ML/day in 2015 in the Mary River) to flows recorded in 2021.

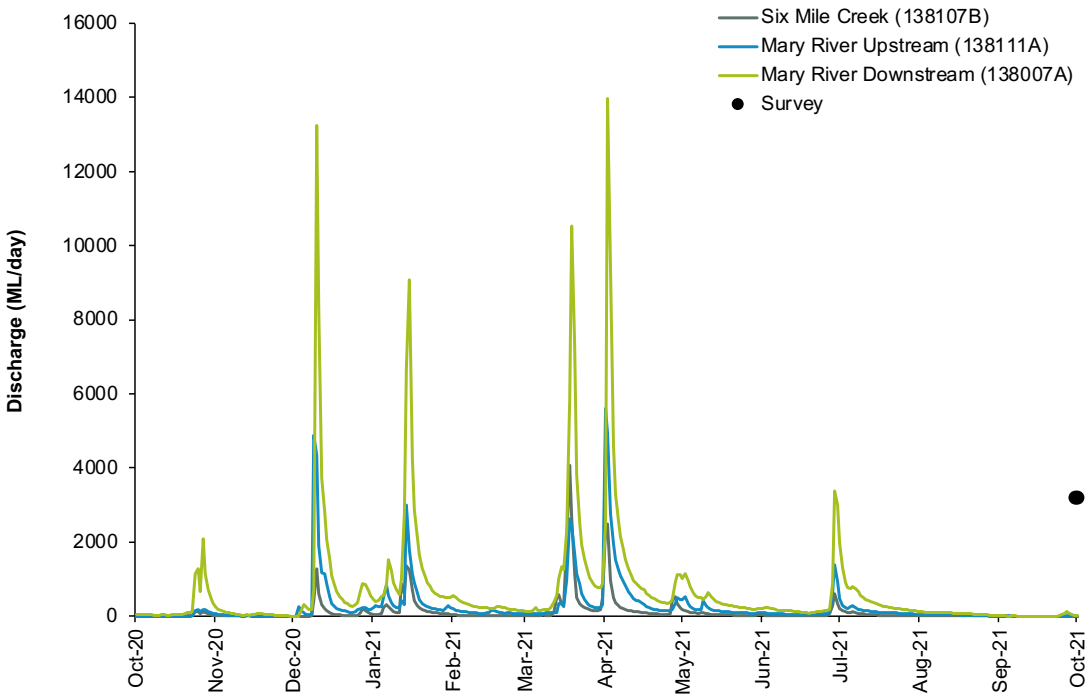


Figure 3.3 Mean daily discharge recorded at stream flow monitoring stations on Six Mile Creek and Mary River.

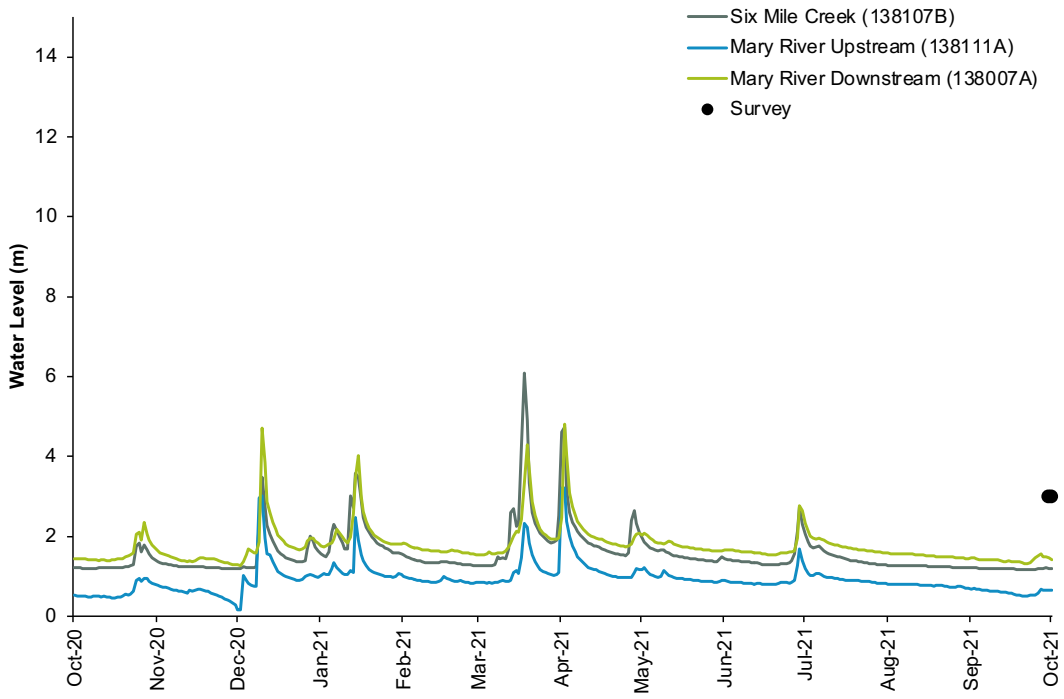


Figure 3.4 Mean daily water level recorded at stream flow monitoring stations on Six Mile Creek and Mary River.

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
- 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 and / or aquatic vegetation.

In general, sites on Six Mile Creek had:

- moderate to good water quality
- 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 (i.e. Mary River cod, Australian lungfish, white-throated snapping turtle and Mary River turtle) were recorded at all sites on the Mary River (Table 3.1). Australian lungfish were observed in-stream at site MR1 on the Mary River during the survey. Habitat in Six Mile Creek was generally considered suitable for juvenile Mary River cod, and potentially suitable for adult Mary River cod, white-throated snapping turtles and Mary River turtles.

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 and October 2021 surveys. In Six Mile Creek, the water levels were similar to the 2020 survey but slightly lower than the 2017 surveys.

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 and October 2021.

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
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

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

Species	Location	Mary River			Six Mile Creek	
	Survey	MR1	MR2	MR4	SMC4	SMC5
	Oct-20	suitable	suitable	suitable	potentially suitable	potentially suitable
	Oct-21	suitable	suitable	suitable	potentially suitable	potentially suitable

4 Summary

In October 2021, as in previous surveys, there was 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 were observed at one site in the Mary River in this survey. While Australian lungfish are occasionally recorded from Six Mile Creek, the habitat in Six Mile Creek is not their preferred habitat, and thus an important population of Australian lungfish is very unlikely to occur in Six Mile Creek (frc environmental 2018). Similarly, while there are favourable habitat elements for Mary River turtle and white-throated snapping turtle, these species have not been recorded from Six Mile Creek, and these species would occur only in low abundance, if at all, in Six Mile Creek (frc environmental 2018). The presence of mainly shallow pools in Six Mile Creek suggested that deeper habitat preferred by adult Mary River cod was limited at the assessed sites, although the shallower pools likely support juvenile and intermediate sized cod. However, gauging station data indicated a relatively stable depth of approximately 1.5 – 2.0 m at the gauging station site in 2021, suggesting other reaches of Six Mile creek likely support habitat suitable for adult Mary River cod. The gauging station data indicates that the dominant water depth has constantly been in the range 1.5 – 2.0 m since 2013. The overall suitability of habitat for MNES species in the Mary River and Six Mile Creek is unchanged compared to the survey in October 2020.

5 References

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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 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	
Temperature (°C)	24.8
Conductivity (µS/cm)	335
Turbidity (NTU)	2.23
Dissolved oxygen (mg/L)	10.08
Dissolved oxygen (% sat)	121.2
pH	8.37

Flow Conditions			
Flow habitats present	Connected in-channel pool		
Water level	Moderate (at watermark)		
Recent high flow	No		
Flow	**Upstream**	**Mid-site**	**Downstream**
Depth (m)	1.2	1.7	2
Width (m)	38	38	39
Velocity (m/s)	0	0	0

Land Use	Grazing land		
Left bank:	Grazing	Right bank:	pump station
Overall disturbance:	Moderate		
Bank Assessment			
Left Bank		**Right Bank**	
Bank material:	sand, silt/clay	Bank material:	sand, clay
Bank height:	5 m	Bank height:	5 m
Bank slope:	steep	Bank slope:	steep
Bank shape:	Convex	Bank shape:	Convex
Vegetation cover:	Moderate	Vegetation cover:	Moderate
Vegetation type:	grass and trees	Vegetation type:	Shrubs and trees
Shading of river:	5%	Shading of river:	5%
Trailing bank vegetation:	10%	Trailing bank vegetation:	5%
Erosion Assessment			
Left Bank		**Right Bank**	
Erosion:	Some	Erosion:	Some
Stability:	Moderate	Stability:	Moderate
Disturbances:	Weeds, cleared vegetation	Disturbances:	Weeds, cleared vegetation
Bed Assessment			
Substrate material:	Cobble, pebble, gravel, sand and silt/clay		
Bed stability rating:	Bed stable	Sediment deposits:	Sand and silt

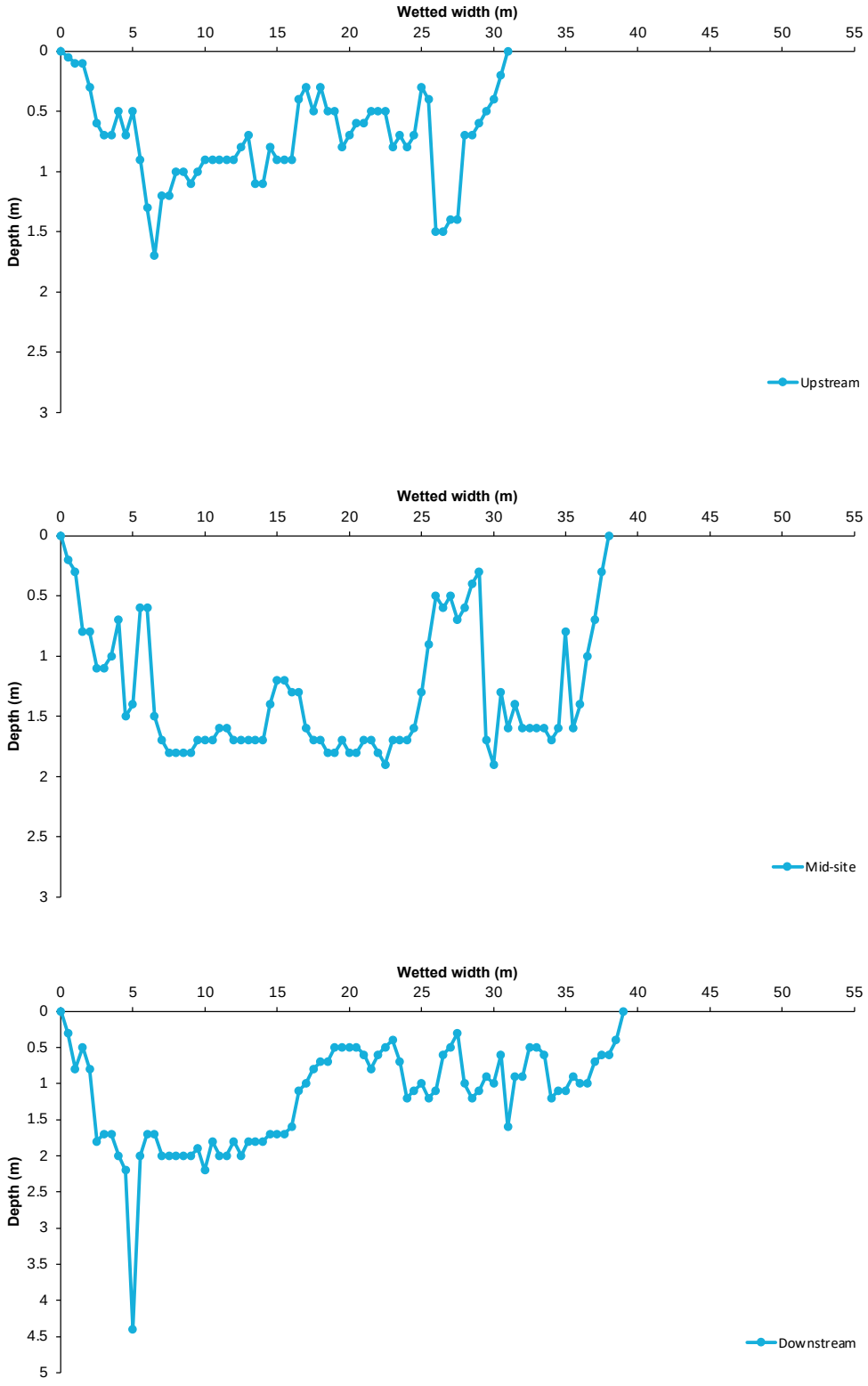


Figure B.1 Site MR1 – channel depth profiles.

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

MNES Species Habitat

Connected pool with no flow

Logs suitable for basking

Logs suitable for basking

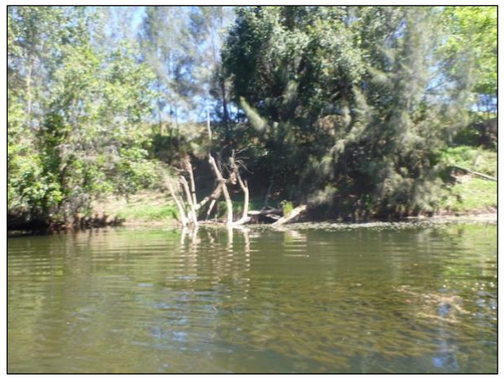
Habitat	Present / Absent	Habitat	Present / Absent
Isolated pools	Absent	Individual log (diameter >250mm)	Present
Connected pools	Present	Individual branch (diameter <300mm)	Present
Riffle	Absent	Branch pile <50% dense (diameter <300mm)	Present
Run	Absent	Branch pile >50% dense (diameter <300mm)	Absent
Aquatic vegetation	Present–dense	Log jam <50% dense (diameter >300mm)	Present
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		

MNES Species Habitat	
Overall suitability	Suitable
Comments:	Patches of suitable habitat for Mary River cod, white-throated snapping turtles, Mary River turtles and lungfish were scattered throughout the site. Pools were deep to 2 m. Most banks were shaded and contained large woody debris. Turtle basking spots, nesting habitat and submerged habitat features were present at MR1. Aquatic vegetation comprised *Elodea* sp. (submerged), *Azolla* sp. (floating), *Pistia* sp. (floating), *Juncus* sp. (emergent).

Table B.3 Site MR1 – Photographic Monitoring.

Site MR1

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.2 Site MR2

Results for site MR2 are presented in Table B.4 – B.6. Site MR2 had suitable habitat to support the MNES species (Mary River cod, Australian Lungfish, white-throated snapping turtle and Mary River turtle). There is no depth profile or images at upstream and mid-sites for site MR2 for the October 2021 survey, as it could not be accessed by boat due to a newly constructed fence.

Table B.4 Site MR2 – water quality, flow, land use, and bed and bank assessment.

Site MR2

Right bank at upstream site

Upstream at upstream site

Left bank at upstream site

Water Quality		**Flow Conditions**			
Temperature (°C)	25.40	Flow habitats present	Connected in-channel pool		
Conductivity (µS/cm)	376.8	Water level	Moderate (at watermark)		
Turbidity (NTU)	3.11	Recent high flow	Yes		
Dissolved oxygen (mg/L)	9.56	**Flow**	**Upstream**	**Mid-site**	**Downstream**
Dissolved oxygen (% sat)	117.3	Depth (m)	max = 2 [a], mean = 1.5 [a]	-	-
pH	7.93	Width (m)	32	-	-
		Velocity (m/s)	<0.01	<0.01	<0.01

Land Use	Grazing land		
Left bank:	Grazing	Right bank:	Grazing
Overall disturbance:	High		
Bank Assessment			
Left Bank		**Right Bank**	
Bank material:	Boulder, cobble, sand, clay	Bank material:	cobble, sand, silt/clay
Bank height:	8 m	Bank height:	10 m
Bank slope:	Steep	Bank slope:	Steep
Bank shape:	Convex	Bank shape:	Convex
Vegetation cover:	Moderate	Vegetation cover:	Moderate
Vegetation type:	Grass, trees	Vegetation type:	Grass, trees
Shading of river:	10%	Shading of river:	10%
Trailing bank vegetation:	15%	Trailing bank vegetation:	25%
Erosion Assessment			
Left Bank		**Right Bank**	
Erosion:	Some	Erosion:	Some
Stability:	Moderate	Stability:	Moderate
Disturbances:	Erosion, weeds, cleared vegetation, access tracks, road	Disturbances:	Erosion, weeds, cleared vegetation, access tracks, road
Bed Assessment			
Substrate material:	Cobble, pebble, gravel, sand and silt/clay		
Bed stability rating:	Bed stable	Sediment deposits:	Silt and sand

[a] visual estimation

Table B.5 MR2 – habitat assessment for MNES species.

MNES Species 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)	Absent
Run	Absent	Branch pile >50% dense (diameter <300mm)	Absent
Aquatic vegetation	Present – sparse	Log jam <50% dense (diameter >300mm)	Present
Turtle basking spots	Present	Log jam >50% dense (diameter >300mm)	Absent
Turtle nesting habitat	Absent	Terrestrial leaves and twigs	Present – scattered
Submerged boulders / rock crevices	Present		
Overall suitability	Suitable		
Comments:	Patches of suitable habitat for Mary River turtles and white-throated snapping turtles, with basking spots present. Deep pools (>4 m) throughout the site provide good habitat for both lungfish and Mary River Cod. The pools were characterized by very low flow at the time of the survey. Submerged large woody debris provide habitat and shelter. Some turtle basking and nesting spots were present, floating aquatic plants (*Azolla* sp., *Salvinia* sp., and *Pistia* sp.) and emergent aquatic plants (*Lomandra* sp. and *Juncus* sp.) were observed at site MR2.		

B.3 Site MR4

Results for site MR4 are presented in Table B.6 – B.9. Site MR4 had suitable habitat to support Mary River cod and lungfish, white-throated snapping turtle and Mary River turtle. Site MR4 had suitable habitat to support all MNES species (Mary River cod, Australian Lungfish, white throated snapping turtle and Mary River turtle).

Table B.6 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)	22.39
Conductivity (µS/cm)	472
Turbidity (NTU)	4.98
Dissolved oxygen (mg/L)	6.86
Dissolved oxygen (% sat)	79.2
pH	7.39

Flow Conditions			
Flow habitats present	Connected in-channel pool		
Water level	Low (below watermark)		
Recent high flow	No		
Flow	**Upstream**	**Mid-site**	**Downstream**
Depth (m)	2.4	4	1.2
Width (m)	32	42	42
Velocity (m/s)	0.001	0	0.019

Land Use	Grazing		
Left bank:	Grazing	Right bank:	Grazing
Overall disturbance:	Very high		
Bank Assessment			
Left Bank		**Right Bank**	
Bank material:	silt/clay	Bank material:	silt/clay
Bank height:	5 m	Bank height:	7 m
Bank slope:	Steep	Bank slope:	Steep
Bank shape:	Convex	Bank shape:	Convex
Vegetation cover:	Some	Vegetation cover:	Moderate
Vegetation type:	Grass, shrubs and trees	Vegetation type:	Grass, shrubs and trees
Shading of river:	5%	Shading of river:	10%
Trailing bank vegetation:	10%	Trailing bank vegetation:	15%
Erosion Assessment			
Left Bank		**Right Bank**	
Erosion:	Some	Erosion:	Moderate
Stability:	Moderate	Stability:	Moderate
Disturbances:	weeds, and cleared vegetation	Disturbances:	Weeds, erosion and cleared vegetation
Bed Assessment			
Substrate material:	Pebble, gravel, sand and silt / clay		
Bed stability rating:	Moderate aggradation	Sediment deposits:	Sand and silt

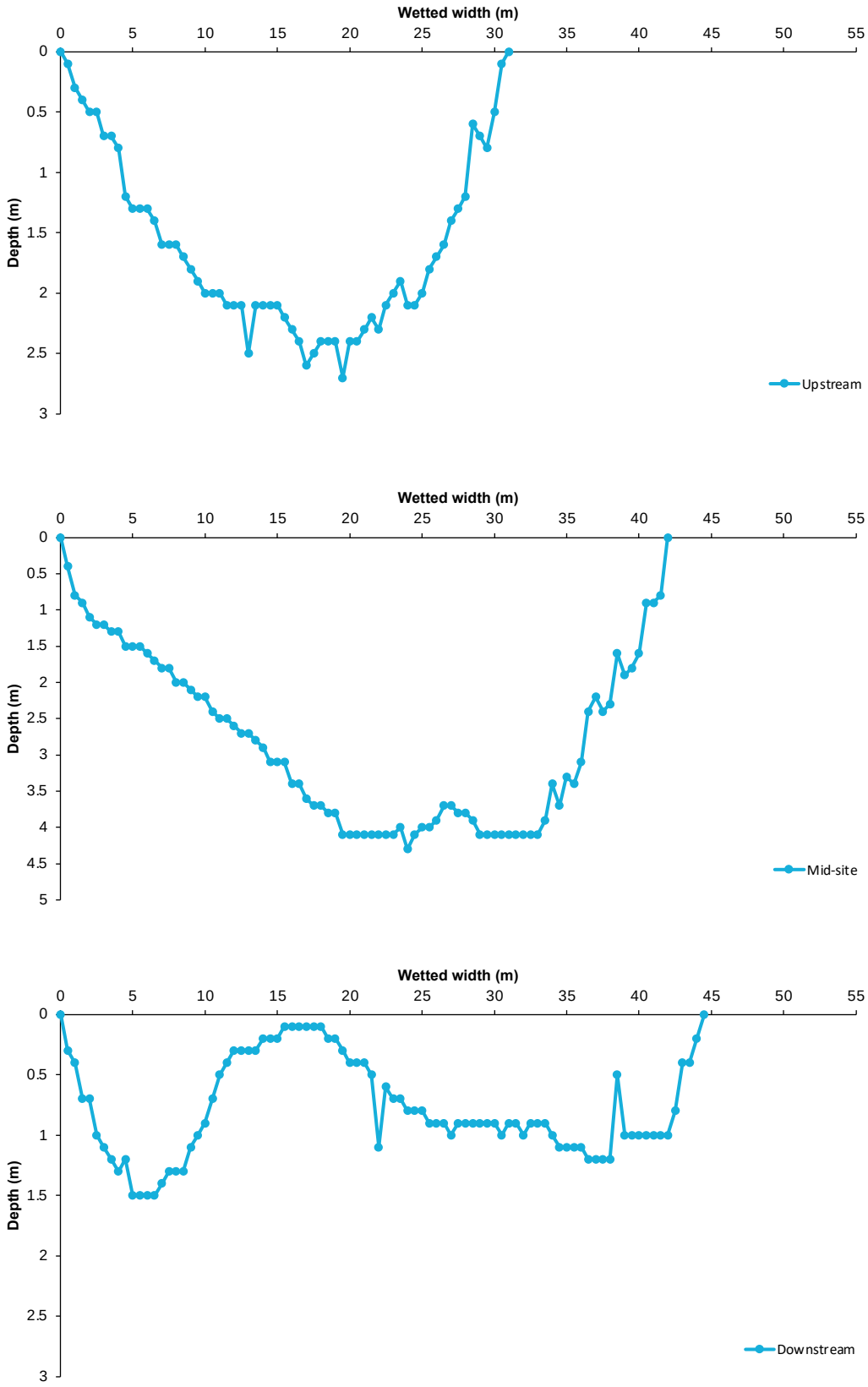


Figure B.3 Site MR4 – channel depth profiles.

Table B.7 Habitat assessment for MNES species at site MR4.

MNES Species Habitat			
			
Logs and woody debris suitable for basking		Connected pool with slow flow	
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)	Absent
Aquatic vegetation	Present/sparse	Log jam <50% dense (diameter >300mm)	Present
Turtle basking spots	Present	Log jam >50% dense (diameter >300mm)	Absent
Turtle nesting habitat	Present	Terrestrial leaves and twigs	Present – scattered
Submerged boulders / rock crevices	Present		

MNES Species Habitat	
Overall suitability	Suitable
	Suitable habitat for Mary River cod, 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 2021 survey. Most deep pools contained large woody debris, with some shading from overhanging vegetation. Turtle basking spots were present in the form of exposed logs that were scattered throughout the site. Aquatic vegetation in emergent form (*Juncus* sp.) and floating form (*Azolla* sp. and *Salvinia* sp.) was observed at site.

Table B.8 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.9 – 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.9 Site SMC4 – water quality, flow, land use, 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)	19.26
Conductivity (µS/cm)	182.4
Turbidity (NTU)	7.96
Dissolved oxygen (mg/L)	3.92
Dissolved oxygen (% sat)	42.8
pH	6.79

Flow Conditions			
Flow habitats present	Connected in-channel pool, riffle, run		
Water level	Low (below watermark)		
Recent high flow	No		
Flow	**Upstream**	**Mid-site**	**Downstream**
Depth (m)	0.5	1	0.3
Width (m)	6.5	9	8.5
Velocity (m/s)	0.018	0.005	0.11

Land Use	grazing		
Left bank:	grazing	Right bank:	grazing
Overall disturbance:	High		
Bank Assessment			
Left Bank		**Right Bank**	
Bank material:	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:	Convex	Bank shape:	Convex
Vegetation cover:	Extensive	Vegetation cover:	Moderate
Vegetation type:	Shrubs (*Lomandra sp.)* and trees	Vegetation type:	Shrubs (*Lomandra* sp.) and trees
Shading of river:	90%	Shading of river:	90%
Trailing bank vegetation:	15%	Trailing bank vegetation:	5%
Erosion Assessment			
Left Bank		**Right Bank**	
Erosion:	Moderate to heavy	Erosion:	Moderate
Stability:	Low to moderate	Stability:	Moderate
Disturbances:	Erosion, cleared vegetation, roads (bridge)	Disturbances:	Erosion, cleared vegetation, tracks and roads
Bed Assessment			
Substrate material:	Cobble, pebble, gravel, sand, silt / clay		
Bed stability rating:	Bed stable	Sediment deposits:	Sand and silt

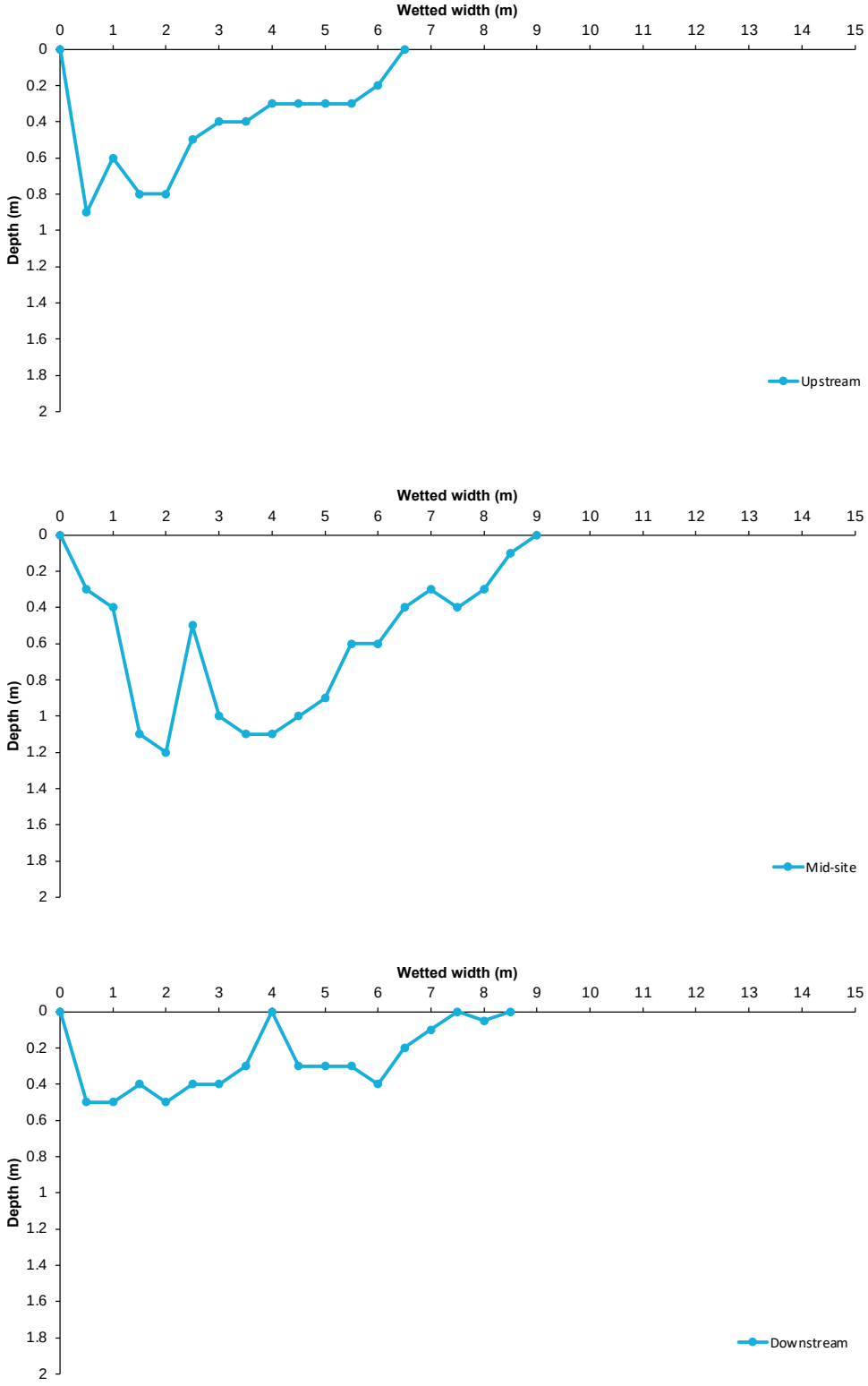


Figure B.2 Site SMC4 – channel depth profiles.

Table B.10 Site SMC4 – habitat assessment for MNES species.

MNES Species Habitat

Woody debris provides basking spot

Riffle provides foraging 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	Absent (none in-stream)	Log jam <50% dense (diameter >300mm)	Present
Turtle basking spots	Present	Log jam >50% dense (diameter >300mm)	Absent
Turtle nesting habitat	Present	Terrestrial leaves and twigs	Present – dense
Submerged boulders / rock crevices	Absent		
Overall suitability	Suitable for white-throated snapping turtles and Mary River turtles, potentially suitable for juvenile Mary River cod		

MNES Species Habitat	
Comments:	Well 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. 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 provided turtle basking spots.

Table B.11 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.12 – B.12 and Figure B.3. 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.12 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)	19.03
Conductivity (µS/cm)	221.7
Turbidity (NTU)	4.62
Dissolved oxygen (mg/L)	3.42
Dissolved oxygen (% sat)	37.1
pH	6.89

Flow Conditions			
Flow habitats present	Connected and isolated in-channel pool, riffle, run		
Water level	Moderate (at watermark)		
Recent high flow	No		
Flow	**Upstream**	**Mid-site**	**Downstream**
Depth (m)	0.2	0.5	0.4
Width (m)	8	14	12
Velocity (m/s)	0.018	0.025	0.08

Land Use	Grazing		
Left bank:	Grazing	Right bank:	Grazing
Overall disturbance:	Moderate		
Bank Assessment			
Left Bank		**Right Bank**	
Bank material:	Sand and clay	Bank material:	Cobble, gravel, sand, silt/clay
Bank height:	6 m	Bank height:	6 m
Bank slope:	Steep	Bank slope:	Steep
Bank shape:	Stepped	Bank shape:	Stepped
Vegetation cover:	Extensive	Vegetation cover:	Extensive
Vegetation type:	Shrubs (*Lomandra* sp.), trees	Vegetation type:	Trees, shrubs (Lomandra)
Shading of river:	75%	Shading of river:	50%
Trailing bank vegetation:	10%	Trailing bank vegetation:	5%
Erosion Assessment			
Left Bank		**Right Bank**	
Erosion:	Moderate	Erosion:	Moderate
Stability:	Moderate	Stability:	Moderate
Disturbances:	Weeds, erosion, cleared vegetation, road	Disturbances:	Erosion, cleared vegetation, access tracks, road
Bed Assessment			
Substrate material:	Sand, silt / clay, gravel, pebble		
Bed stability rating:	Bed stable	Sediment deposits:	Sand

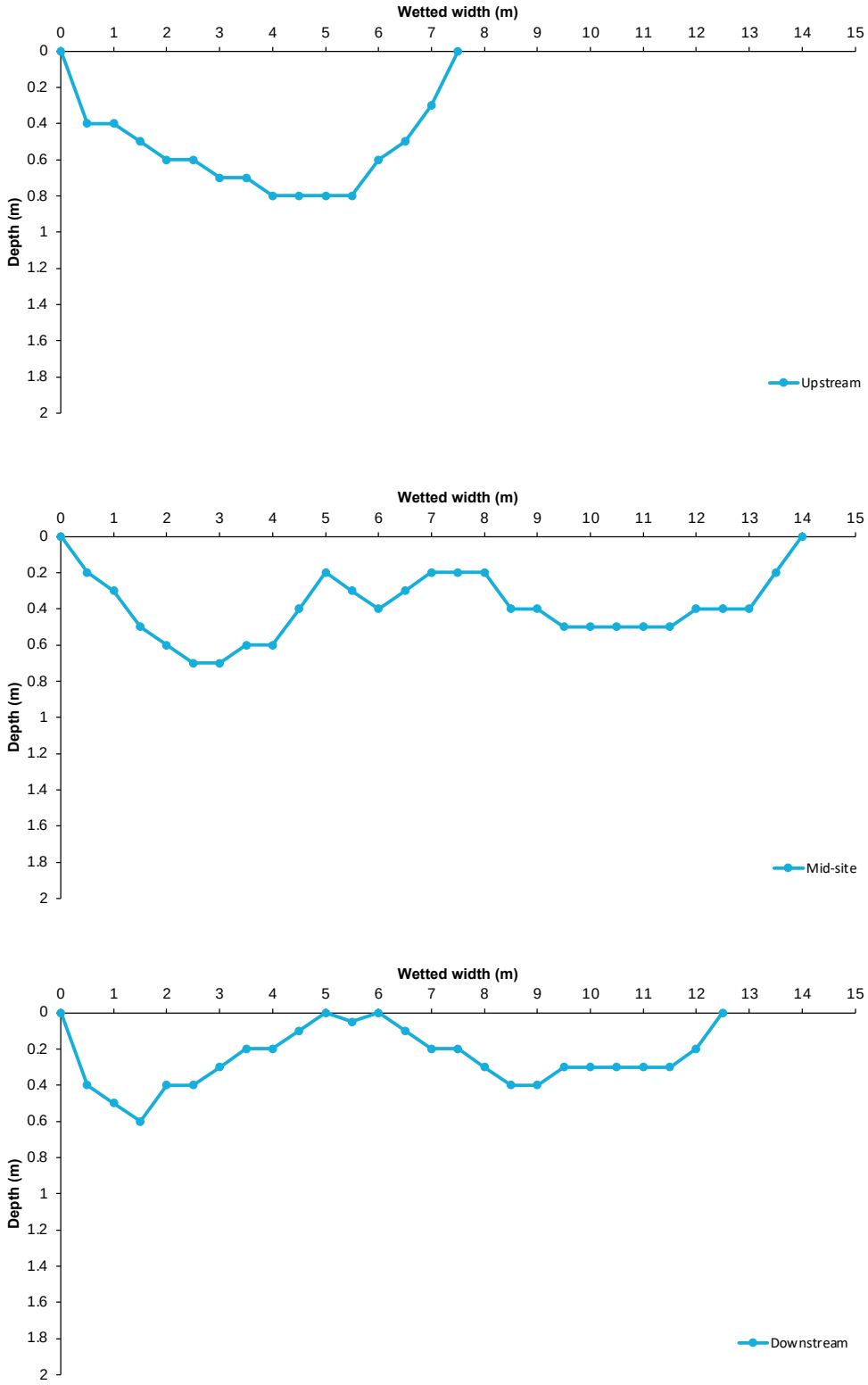


Figure B.3 Site SMC5 – channel depth profiles.

Table B.13 Site SMC5 – habitat assessment for MNES species.

MNES Species Habitat

Bank provide basking habitat

Logs provide basking habitat

Sandy banks probide nesting habitat

Habitat	**Present / Absent**	**Habitat**	**Present / Absent**
Isolated pools	Present	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		
Overall suitability	Potential for Mary River cod, white-throated snapping turtle and Mary River turtle, unsuitable for Australian lungfish		

MNES Species Habitat	
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 fast flowing riffles but no deep foraging pools were present. However, protruding logs and woody debris were present providing suitable basking spots for turtles. Aquatic vegetation consisted of emergent plants along banks *Lomandra* sp.

Table B.14 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