NEW GOLD RAINY RIVER MINE
APPENDIX O
SCHEDULE 2 MDMER FISH HABITAT COMPENSATION PLAN

Rainy River Mine

2018 Annual Monitoring Report – Schedule 2 MDMER Fish Habitat Compensation Plan
Emo, Ontario
TC111504

Prepared for:

New Gold Inc.

5967 Highway 11/71, P.O. Box 5, Emo, Ontario P0W 1E0

December 2018

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited
110-160 Traders Blvd. E., Mississauga, ON L4Z 3K7
www.woodplc.com

December 22, 2018

Ms. Sylvie St-Jean, Environmental Manager
Rainy River Mine
5967 Highway 11/71
P.O. Box 5
Emo, Ontario, Canada P0W IE0
Telephone: (807) 482-2501
Facsimile: (807) 482-2834

Dear Ms. St-Jean:

Re: 2018 Annual Monitoring Report
Schedule 2 MDMER Fish Habitat Compensation Plan, Rainy River Mine
Emo, Ontario

Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood) was retained by New Gold Inc. (New Gold) to complete the year-one annual performance monitoring of the Schedule 2 Metal and Diamond Mining Effluent Regulations Fish Habitat Compensation Plan at the Rainy River Mine in Emo, Ontario. The compensation waterbodies included Clark Creek, Stockpile and West Creek ponds and diversion channels. The purpose of this 2018 annual monitoring report is to summarize the first year of performance monitoring for the compensation measures and to provide recommendations to improve future annual performance monitoring programs.

Sincerely,
Wood Environment & Infrastructure
a Division of Wood Canada Limited

Prepared by:

Dale Klodnicki, M.E.Sc., C.E.T.
Senior Aquatic Ecologist

Reviewed by:

Mark Ruthven, C.E.T.
Head, Environmental Assessment

Rainy River Mine

2018 Annual Monitoring Report – Schedule 2 MDMER Fish Habitat Compensation Plan
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Prepared for:

New Gold Inc.
5967 Highway 11/71, P.O. Box 5, Emo, Ontario P0W 1E0

Prepared by:

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited
110-160 Traders Blvd. E., Mississauga, ON L4Z 3K7
Date December 14, 2018

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Third-party disclaimer

Executive Summary

The New Gold Inc. (New Gold) Rainy River Mine is situated in the Township of Chapple, approximately 65 kilometres northwest of Fort Frances in Northwestern Ontario. This report provides findings of the year-one post-construction performance monitoring as per commitments made in the regulatory amendment to Schedule 2 of the Metal and Diamond Mining Effluent Regulations listing and associated Fish Habitat Compensation Plan (FHCP). The FHCP requires monitoring for the construction and post construction phases of development and the two primary commitments include:

1. As-Constructed report which was submitted December 2017; and

2. Annual performance monitoring studies to confirm the physical function, structural stability and fish community ecological success metrics.

Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited was retained by New Gold to conduct the year-one performance monitoring to evaluate the success of the compensation measures implemented under the FHCP. Implementation and effectiveness of the measures are determined by confirming that Clark Creek Diversion (includes Clark Creek Pond and Diversion Channel) and West Creek Diversion (includes Stockpile Pond and Diversion Channel, and the West Creek Pond and Diversion Channel) have been constructed as per the approved plans and are functioning as intended using the success criteria in the FHCP.

The 2017 As-Constructed report showed the physical construction of compensation measures achieved the required success criteria. The year-one perfomance monitoring of ecological success criteria related to the physical function, structure stability and fisheries components of the FHCP were generally achieved in 2018 as described below:

- The Clark Creek Pond and West Creek Pond diversion channels allowed for fish passage under normal and high flow conditions and the Clark Creek and West Creek pond water levels are consistent with those specified in the design;
- Constructed habitat remains stable and in place for all Schedule 2 Amendment waterbodies. Shorelines and graded offset features are stable, and riparian vegetation cover and plantings have achieved moderate to good coverage, greater than the 80% success criteria;
- Seven fish species are present in the Clark Creek Diversion, whereas 12 species are present within the West Creek Diversion (success criteria target nine species);
- Multiple year classes of several species, and many young-of-the year fish were encountered in the compensation measures demonstrating full fish life cycle usage; and,
- Overall catch-per-unit-effort for seine netting achieved fish abundance success criteria, with the remaining gear-specific results showing the fish community is on track to meet the success criteria targets before 2021.

The success criteria related to the physical function of Stockpile Pond and the portion of the Stockpile Diversion Channel, between the pond outlet and confluence with West Creek Tributary 2, did not perform as expected. The pond water level decreased during the summer and water was not flowing in the above noted section of the diversion channel. Consequently, approximately 75% of the West Creek Diversion achieved the FHCP performance criteria. However, the function of the Stockpile Pond is still largely effective at providing a permanent habitat for small bodied fish. The observed maximum depth of

Stockpile Pond in 2018 is more than sufficient to provide overwintering refuge areas for all resident fish species and therefore is serving the intended function but connectivity between Stockpile Pond, Stockpile Diversion and West Creek Pond will be monitored.

Biological systems such as Clark Creek, Stockpile and the West Creek ponds and diversion channels are dynamic and will likely require several years to develop biological communities that meet the success criteria; however, the year-one monitoring results show very good progress toward these targets.

Table of Contents

List of Figures

List of Tables

List of Appendices

1.0 Introduction

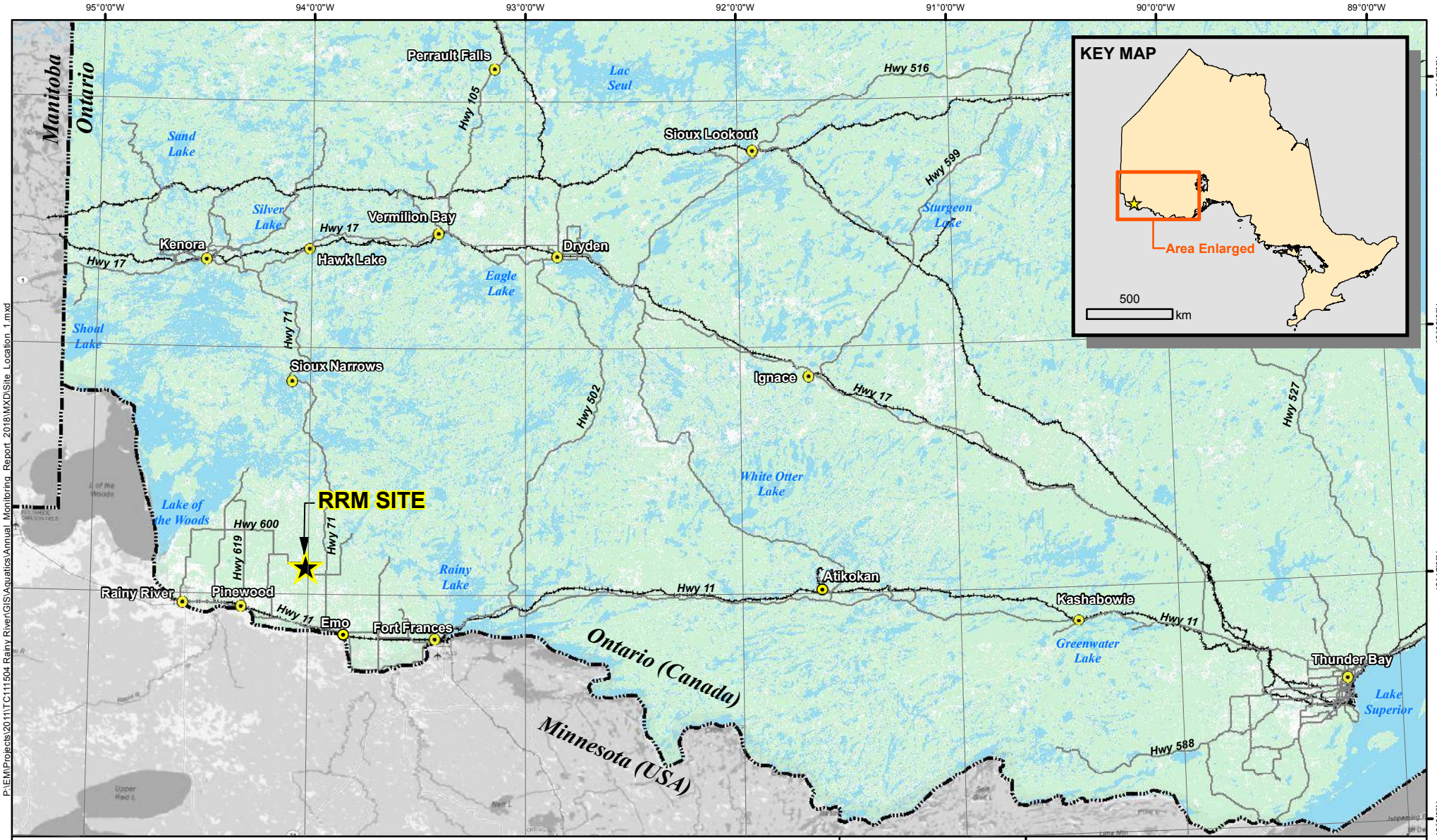
The New Gold Inc. (New Gold) Rainy River Mine (RRM) is situated in the Township of Chapple, approximately 65 kilometres (km) northwest of Fort Frances in Northwestern Ontario (Figure1-1). This Fish Habitat Compensation Plan (FHCP) annual monitoring report is provided for compliance with the commitments of the FHCP pursuant to the Schedule 2 Metal and Diamond Mining Effluent Regulations (MDMER) amendments associated with the project. This is the first year of a specified five year monitoring cycle.

Construction and development of the RRM required the deposition of mine waste (overburden, rock and mine water / effluent) in waterbodies that are frequented by fish. This deposition required a regulatory amendment to Schedule 2 of the MDMER. In order for the Government of Canada to complete the regulatory amendment, an approved FHCP was provided to offset losses of fisheries associated with the deposits. Previously, a detailed No Net Loss Plan (NNLP) for the MDMER Schedule 2 Amendment Waterbodies (AMEC 2014a,b) had been prepared for the RRM and circulated to stakeholders during the Environmental Assessment process. A subsequent detailed FHCP was submitted to Department of Fisheries and Oceans Canada (DFO) in May 2015 which was intended to summarize the impacts and compensation measures described in the NNLP and provide additional details of the associated monitoring commitments (Amec Foster Wheeler 2015). Schedule 2 waterbody listings do not have formal DFO authorizations and monitoring conditions associated with them as do Section 35 *Fisheries Act* approvals. Instead, the approved FHCP, as per Section 27 of the MDMER becomes the agreed upon and contractual commitment for the construction and monitoring of the compensation measures.

A revised FHCP to address changes to the site design and Project schedule was submitted in January 2017 (Amec Foster Wheeler 2017a). The Schedule 2 amendment process was completed in fall 2017 (as published in Canada Gazette vol 151(20), October 4, 2017).

The impacted fish community, and corresponding target fishery of the FHCP are baitfish (primarily minnow) species that inhabit the small creek systems associated with the site. The compensation waterbodies include Clark Creek, Stockpile and West Creek ponds and diversion channels. Construction of Clark Creek Pond was completed in early 2016 and construction of the Clark Creek diversion channel was completed by late 2016. The Stockpile Pond and diversion channel were constructed by early 2016, whereas the West Creek Pond and Diversion Channel construction was completed by late 2017. An As-Constructed monitoring report was submitted December 2017 (Amec Foster Wheeler 2017b) as per Section 8.3, Table 5 of the approved FHCP.

The As- Constructed report confirmed that overall the compensation measures were constructed and functioning as per the approved plans. The purpose of this 2018 annual performance monitoring report is to summarize the first year of performance monitoring; which includes biological and habitat stability indicators, for the constructed ponds and diversion channels.



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LEGEND

- RRM Site
- Regional Communities
- Provincial / National Border
- Regional Road / Highway
- Railway

0 25 50 100 150 200 250 Kilometres

NOTES:
- Ontario base data extracted from Land Information Ontario (MNR) data warehouse, Queen's Printer for Ontario, 2011-2012
- Base data outside of Ontario extracted from ESRI DeLorme World Basemap

Datum: NAD83
Projection: UTM Zone 15N

N W E S

newgold Rainy River Project wood.

RAINY RIVER MINE

Site Location

PROJECT N°: TC111504	**FIGURE: 1-1**
SCALE: 1:1,800,000	DATE: December 2018

2.0 Schedule 2 Listed Waterbodies and Monitoring Requirements

The RRM works listed to Schedule 2 are as follows:

1. Development of the Tailings Management Area (TMA) which will impound tailings in the upper reaches of Loslo Creek and Marr Creek;

2. Construction of the Water Discharge Pond and Constructed Wetland in the mid and lower reach of Loslo Creek. These ponds will receive treated mine effluent and seepage from the TMA dam; and

3. Construction of the West Mine Rock and Overburden Stockpiles in the lower reach of Marr Creek.

The delineation of mine works and approved Schedule 2 waterbodies associated with the RRM, as well as the performance monitoring locations discussed in the following sections are shown on Figures 2-1 and 2-2.

The FHCP requires monitoring for the construction and post construction phases of development. The two primary commitments include:

3. As-Constructed report which was submitted December 22, 2017 (Amec Foster Wheeler 2017b) and included the following measures:

    a. An As-Constructed survey to confirm the physical construction of compensation measures were as per the approval FHCP design. The survey included areas of wetted and frequently flooded habitats, all constructed habitat features, water depths, vegetation zones, and channels;

    b. Photo documentation record during construction to document that mitigation and avoidance measures were implemented, and that all structures were constructed as per the approved FHCP design; and

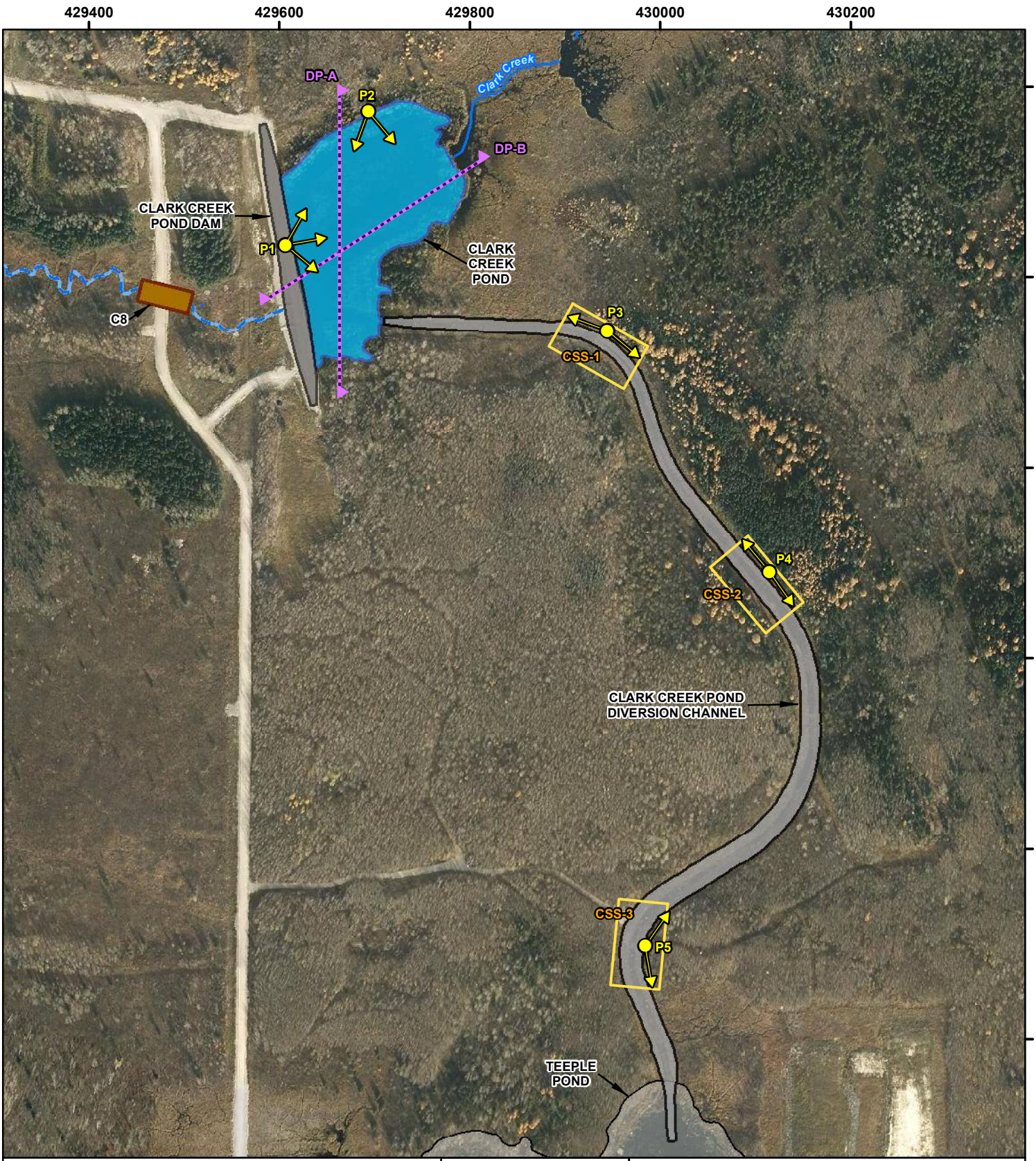
    c. A comparison of the constructed habitat to the approved FHCP to confirm that the area of replacement habitat is equal to or greater than 25.7 hectares (ha).

4. This annual performance monitoring report to show ecological success, including;

    a. Physical function of compensation measures;

    b. Structural stability of compensation measures; and

    c. Fish community metrics including species richness, full life cycle usage of created habitat and standardized fish abundance targets.



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LEGEND

- P# — Photo Station
- DP-A — Depth Profiles
- CSS-# — Channel Stability Station/Biological Monitoring
- Clark Creek Pond Extent
- Dam / Diversion Channel
- Teeple Pond
- Culverts (Not to scale)
- Remnant Channel
- Watercourse

0 50 100 200 300 400 500 Metres

NOTES:
- Aerial imagery - Pleiades October 2017.

Datum: NAD83
Projection: UTM Zone 15N

newgold Rainy River Project wood.

RAINY RIVER MINE

Clark Creek Pond and Diversion Channel Monitoring Locations

PROJECT N°: TC111504 | **FIGURE: 2-1**

SCALE: 1:5,500 | DATE: December 2018

422000 423000 424000 425000 426000 427000

5412000 5411000 5410000 5409000

TAILINGS MANAGEMENT AREA DAM
WATER DISCHARGE POND
WEST CREEK DIVERSION CHANNEL
CONSTRUCTED WETLAND
SEDIMENT POND #1
SEDIMENT POND #2
OVERBURDEN STOCKPILE
WEST MINE ROCK STOCKPILE
OVERFLOW DIVERSION STRUCTURE
BOX CULVERT
WEST CREEK POND
WEST CREEK POND DAM
ROEN RD. BOX CULVERT
PROCESS PLANT
STOCKPILE DIVERSION CHANNEL
STOCKPILE POND
STOCKPILE POND DAM
OPEN PIT
LOW GRADE ORE STOCKPILE
MINE ROCK POND
Roen Road
Marr Creek
West Creek
Losb Creek
Pinewood River
Clark Creek
C2 C10 C12 C13 C14 C15 C16
P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14
CSS-1 CSS-2 CSS-3 CSS-4 CSS-5 CSS-6 CSS-7 CSS-8
DP-A DP-B

P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Annual_Monitoring_Report_2018\MXD\West_Creek_Pond_Monitoring_Locs_1.mxd

LEGEND

- Passive Flow
- Overflow Route
- P# Photo Station
- DP# Depth Profiles
- CSS# Channel Stability Station/Biological Monitoring
- Culverts (Not to scale)
- Diversion Channel
- Dam
- Pond
- Construction Haul Road
- Mine Infrastucture
- Remnant Watercourse
- Existing Watercourse
- Existing Waterbody

0 0.25 0.5 1 1.5 2 Kilometres

NOTES:
- Aerial imagery - Pleiades October 2017.

Datum: NAD83
Projection: UTM Zone 15N

N W E S

newgold Rainy River Project wood.

RAINY RIVER MINE

Stockpile Pond, West Creek Pond and Diversion Channel Monitoring Locations

PROJECT N°: TC111504 | **FIGURE: 2-2**

SCALE: 1:16,000 | DATE: December 2018

3.0 Criteria to Assess Performance of the Compensation Measures

Implementation and effectiveness of the compensation measures are determined by confirming that Clark Creek Diversion (includes Clark Creek Pond and Diversion Channel) and West Creek Diversion (includes Stockpile Pond, West Creek Pond and associated diversion channels) have been constructed as per the approved FHCP and are functioning as intended using the prescribed monitoring criteria. The FHCP performance monitoring success criteria and corresponding section within this report are presented in Table 3-1.

Table 3-1: Performance Monitoring Success Criteria for Compensation Measures

Attribute	Report / Section	Success Criteria
Physical construction of compensation measures	Compensation Plan for MMER Schedule 2 Amendment Waterbodies As-Constructed Report; submitted December 22, 2017 Summary provided in Section 4.0.	• As-built survey demonstrated that measures were constructed as per the approved FHCP • Area of replacement habitat was equal to or greater than 25.7 ha
Physical function of compensation measures	Section 5.0	• Water levels are consistent with those specified in the design • The outlet channel and pond allow for passage of fish
Stability of structures	Section 6.0	• Constructed habitat features remain in place (log and boulder structures in place) • Shorelines and graded offset features are stable and not eroding (greater than 80% of features are considered stable) • Riparian vegetation cover and plantings achieve 80% coverage of area, and/or survival of planted stock
Species presence	Section 7.0	• Minimum of 9 species of fish are present in each of the two (2) diversion areas (Clark Creek and West Creek Diversion).
Full life cycle usage		• Multiple year classes including young of the year fish are present in the compensation features.

Fish abundance		• Overall Catch per Unit Effort (CPUE) for all species combined, for at least two of following capture methods (electrofishing, Minnow Traps, Seine Nets). Minimum success criteria are:
		  ◦ Minnow Trap CPUE ≥ 2 fish per trap hour
		  ◦ Seine Net CPUE ≥ 16 fish per 15 m net pull
		  ◦ Electrofishing CPUE ≥ 44 fish per 1,000 seconds

4.0 Physical Construction of Compensation Measures

An As-Constructed report for the Schedule 2 Amendment Waterbody Compensation meaures was issued December 22, 2017 (Amec Foster Wheeler 2017b). The As-Constructed report provided the following:

- A summary of upset conditions and contingency responses;
- Comparisons between design parameters and as-constructed conditions of the compensation measures;
- Comparisons between design parameters and as-constructed depths of the compensation measures;
- A summary of deviations from design and recommended monitoring for the compensation measures; and
- Comparisons between design areas and as-constructed habitat areas of the compensation measures.

Comparison of the constructed habitat to the approved plan confirmed the as-constructed compensation measures generally exceeded the design area committed to in the FHCP as follows:

Compensation Measure	Design Area (ha)	Actual Constructed Area (2017)(ha)	Observerved Areas (2018) (ha)
Clark Creek Pond and Diversion Channel	3.86	3.99	maintained
Stockpile Pond and Diversion Channel	5.64	5.67	1.69
West Creek Pond and Diversion Channel	16.08	16.07	maintained
Combined Areas	**25.6**	**25.7**	**21.7**

A total of 25.7 hectares (ha) of replacement habitat was constructed, which is greater than the proposed minimum area of 21.3 ha of compensation measures. The 2017 As-Constructed report demonstrated that the compensation structures (ponds and diversion channels) specified in the FHCP were met, and that the minor deviations from design were not expected to impact the overall success of the Plan.

The 2018 performance monitoring data show Stockpile Pond did not fill as anticipated, and the static pond water level measured during July 2018 field studies was used to calculate an approximate surface area of 16,902 m^2. This lower surface water elevation at the time of pond water depth measurements means Stockpile Pond was providing approximately 30% of the intended replacement habitat specificed in the approved design for Stockpile Pond. The year-one performance monitoring studies observed that the habitat areas provided more than the minimum area specified in the approved FHCP, and the following sections discuss this difference in existing conditions relative to the physical function, structure stability and fish community performance monitoring success criteria.

5.0 Physical Function of Compensation Measures

The surrounding waterbodies and watercourse near the RRM naturally experience periods of low precipitation and dry conditions that can temporarily limit fish passage and physical function of these habitats. The 2018 precipitation records from the Environment and Climate Change Canada (ECCC) Barwick, Ontario climate station and records from the onsite New Gold meteorological station (Barron Site) data were compared to the 1981 to 2010 Canadian climate normals. The recent data confirms 2018, particularly the Barron Site data during the open water period between April and August, was generally drier than the normal values (Figure 5-1). The 2017 ECCC data are also shown, which suggest a recent trend in higher than average amounts of precipitation are occurring in September with drier than average conditions during the summer months. Consequently, these drier conditions have potential implications to the physical function and performance of the compensation measures as discussed below.

The approved FHCP physical function performance monitoring criteria discussed in the following sections include:

- Water depth measurement, water level monitoring and photo documentation of pond conditions; and
- Water depth and velocity measurements in the diversion channels to be collected in pools, flats and riffles during at least one low flow period and one high flow period each year (for 5 years).

5.1 Physical Function of Clark Creek Diversion

The physical function of Clark Creek Diversion performance monitoring results show Clark Creek Pond water levels were maintained as per the approved design throughout the 2018 monitoring period as documented by the water level logger data, manually surveyed water levels, and manually measured water depths throughout the pond. The physical function of Clark Creek Diverion Channel performance monitoring results show channel water levels were maintained per design throughout the spring high flow period and intermittent flow was observed during the low flow period as expected. As such, the Clark Creek Diversion has achieved the physical function success criteria as specified in the approved FHCP, and discussed in further detail below.

5.1.1 Physical Function of Clark Creek Pond

Clark Creek Pond was built to include permanent deeper water refuge pools, log and boulder structures, and highly productive emergent wetland margins with a normal water level of 378.7 metres above sea level (masl). The overwintering and summer refuge habitat were constructed to provide between 1.5 and 2.75 metres (m) of total water depth at static pond water level design elevation. Performance monitoring the physical function of Clark Creek Pond included:

- Photo documentation of pond water levels and stability monitoring stations discussed in Section 7.0 (Appendix A and B, respectively);
- Installation of a Solinst 3001 LT Levelogger Edge, M10 water level logger adjacent to the dam with a direct read cable on June 10, 2017 (Figure 5-2 and Appendix A); and
- Manual water depth measurements of the overwintering and summer refuge habitat during the summer for comparison to design water depths (Table 5-1).

The Clark Creek Pond water level logger pressure sensor data, as well as the manually surveyed water level data shown on Figure 5-2 confirm the pond maintained water levels throughout 2018, with a maximum seasonal fluctuation of 0.39 m during the open water period (April to November).

As specified in the FHCP, water depth measurements of the pond area were conducted once per year during the monitoring period to confirm refuge areas are maintained. The FHCP As-Constructed report (Amec Foster Wheeler 2017b) confirmed refuge areas were established per the design and in-field water depth measurements during the 2018 summer field studies confirmed that these areas maintained appropriate water depths of 1.5 to 2.8 m within the refuge pool and connecting channels (Table 5-1). The Clark Creek Pond as-constructed drawings, showing the maunual depth measurement locations are provided in Appendix C.

5.1.2 Physical Function of Clark Creek Diversion Channel

Clark Creek Diversion Channel high flow performance monitoring was initiated on April 25, 2018 by Wood field staff. The observed high flow conditions show sufficient water depth existed during spring freshet to maintain fish passage between Clark Creek Pond and the diversion channel (Table 5-2). The total depths of riffles ranged between 0.02 and 0.50 m, with measured velocities ranging from 0.004 to 1.313 metres per second (m/s) which is within the sustained swimming speeds for the resident species relative to body size and the short swim distances through the riffle areas with higher velocity (Gervais & Katopodis 2013, Di Rocco 2018). The photograph record provided in Appendix A.2 illustrates water level conditions within the channel during April and July 2018.

The low flow monitoring event on July 24, 2018 was also conducted by Wood field staff. Diversion channel wetted widths, total depths and water velocity in pools, flats and riffles were measured where possible (Table 5-3) throughout the channel stability stations shown on Figure 2-1. The low gradient of Clark Creek Diversion Channel provided pool and flat habitat throughout most of the channel; however, no measureable flow was observed within the channel due to intermitent flow conditions. Total depths ranged from 0.04 to 0.61 m within all habitat types (Table 5-3). Figure 5-1 shows a comparison between the 2017 and 2018 Barwick, Ontario monthly precipitation records to the 1981 to 2010 Canadian climate normal for this area, demonstrating the 2018 period of record was drier than 2017 and both years were drier than the normal values. Fish were found in all sampled channel habitats, demonstrating the fish are passing through the channel and connectivity is maintained with Teeple Pond downstream even between periods when the outlet of Clark Creek Pond is not actively flowing.

5.2 Physical Function of West Creek Diversion

The West Creek Diversion achieved the physical function success criteria as specified in the approved FHCP for West Creek Pond and Diversion Channel. Stockpile Pond did not function as intended, with the static water level elevation approximately 2.8 m less than the design thereby providing approximately 30% of the replacement habitat specified in the design. The low pond water level meant the section of Stockpile Diversion Channel between the pond outlet and West Creek Tributary 2 did not receive outflow water in 2018. Consequently, Stockpile Pond and Stockpile Diversion Channel did not achieve the physical area success criteria as discussed in further detail below.

5.2.1 Physical Function of Stockpile Pond

Stockpile Pond was built to include permanent deeper water refuge pools, log and boulder structures, and highly productive emergent wetland margins with a normal water level of 372.3 masl. The overwintering

and summer refuge habitat were constructed to provide between 2.0 and 6.3 m of total water depth at static pond water level design elevation. Monitoring the physical function of Stockpile Pond included:

- Photo documentation of pond water levels and stability monitoring stations discussed in Section 7.0 (Appendix A and B, respectively);
- Installation of a Solinst 3001 LT Levelogger Edge, M10 water level logger adjacent to the diversion channel, opposite the dam in dry conditions, with a direct read cable on June 15, 2017 (Figure 5-3 and Appendix A); and
- Manual water depth measurements of the overwintering and summer refuge habitat during the summer for comparison to design water depths (Table 6-4).

The Stockpile Pond water level logger pressure sensor data on Figure 5-3 show the water level increased during spring freshet conditions and the transducer was submerged from approximately March 21 to July 25, 2018. The most recent peak in water level occured on approximately May 25, 2018, afterwhich water levels steadily decreased until the transducer was above the water level on July 25, 2018. The period of record between July 25 and November 28, 2018 indicates water levels were below the transducer and Stockpile Pond was not maintaining a normal water level per the approved design.

As specified in the approved FHCP, water depth measurements of the pond area were conducted on July 29, 2018, even though water levels were below design elevation. The in-field water depth measurements of refuge areas showed water depths of 0.20 to 3.2 m where depths should have ranged from 3.2 to 5.2 m per the design (Table 5-4). The Stockpile Pond as-constructed drawings, showing the manual depth measurement locations are provided in Appendix C.

Despite the reduced aerial extent and maximum depth of the stockpile pond diversion habitat, the function of the measure is still largely effective at providing a permanent habitat for small bodied fish. The observed maximum depth of 3.2 m is more than sufficient to provide overwintering refuge areas for all resident fish species.

5.2.2 Physical Function of Stockpile Diversion Channel

Stockpile Diversion Channel high flow performance monitoring was initiated on April 25, 2018 by Wood field staff. The survey documented that water from Stockpile Pond was not flowing through the channel; however, water from the West Creek Tributary 2 stream provided constant flow during the high flow monitoring event. Consequently, the section of diversion channel between the pond outlet and the confluence with West Creek Tributary 2 did not receive flow during the 2018 season other than surface runoff during periods of precipitation. As discussed above, 2018 was a drier than average year, and additional years monitoring will confirm whether this channel segment is periodically flowing and as such hydraulically connected to the downstream habitats.

High flow monitoring was conducted between the West Creek Tributary 2 inflow and the outlet to West Creek Pond near the Roen Road box culverts. The pool and flat habitats contained total depths of up to 0.57 m with velocities ranging from 0 to 0.422 m/s. The total depths of riffles ranged between 0.04 and 0.14 m, with velocities ranging between 0.179 to 0.833 m/s (Table 5-5). These velocities are within the sustained swimming speeds for the resident species relative to body size and the short swim distances through the riffle areas with higher velocity (Gervais & Katopodis 2013, Di Rocco 2018). The photograph record provided in Appendix A.3 illustrates water level conditions within the channel during April and July 2018.

The low flow monitoring event on July 24, 2018 documented water from Stockpile Pond was not flowing through the channel due to low pond water level elevation and there was no flow contribution from West Creek Tributary 2. Consequently, the diversion channel performance monitoring was conducted within areas of the channel between the Roen Road box culverts crossing and upstream confluence with the West Creek Tributary 2 where possible (Table 5-8) throughout the pre-determined channel stability stations shown on Figure 2-2. Diversion channel reaches with flat and pool morphology maintained sufficient water depth to provide fish habitat; however, the riffle areas were mostly dry (Table 5-6). The dry conditions are natural to the system during periods of intermittency, and 2018 represented drier than average conditions. Fish were found in the isolated pools, thereby demonstrating fish are passing through the channel during periods of flow. This was further substantiated by observations from New Gold and Wood site staff in early May 2018 that confirmed White Sucker (*Catostomus commersonii*) were staging to spawn and congregating at the Roen Road box culverts in the lower reaches of the diversion channel.

5.2.3 Physical Function of West Creek Pond

West Creek Pond was built to include permanent deeper water refuge pools, log and boulder structures, and highly productive emergent wetland margins with a normal water level of 361.0 masl. The overwintering and summer refuge habitat were constructed to provide between 1.5 and 4.0 m of total water depth at static pond water level design elevation. Monitoring the physical function of West Creek Pond included:

- Photo documentation of pond water levels and stability monitoring stations discussed in Section 7.0 (Appendix A and B, respectively);
- Installation of a Solinst 3001 LT Levelogger Edge, M10 water level logger adjacent to the dam, near the outlet spillway, with a direct read cable on April 26, 2018 (Figure 5-2 and Appendix A); and
- Manual water depth measurements of the overwintering and summer refuge habitat during the summer for comparison to design water depths (Table 5-7).

The West Creek Pond water level logger pressure sensor data, as well as the manually surveyed water level data shown on Figure 5-4 confirm the pond maintained water levels throughout 2018, with a maximum seasonal fluctuation of 0.24 m during the open water period (April to November).

As specified in the approved FHCP, water depth measurements of the pond area were conducted once per year during the monitoring period to confirm refuge areas are maintained. The FHCP as-constructed report (Amec Foster Wheeler 2017b) confirmed refuge areas were established per the design and in-field water depth measurements during the 2018 summer field studies confirmed that these areas maintained appropriate water depths of 1.0 to 4.6 m within the refuge pool and connecting channels (Table 5-1). The West Creek Pond as-constructed drawings are provided in Appendix C.

5.2.4 Physical Function of West Creek Diversion Channel

West Creek Diversion Channel high flow performance monitoring was initiated on April 24, 2018 by Wood field staff. The observed high flow conditions show sufficient water depth existed during spring freshet to maintain fish passage between West Creek Pond, the diversion channel and Loslo Creek (Table 5-8). The total depths of riffles ranged between 0.06 and 0.41 m, with velocities ranging between 0.043 to 0.959 m/s (Table 5-8). These measured velocities are within the sustained swimming speeds for the resident species relative to body size and the short swim distances through the riffle areas with higher velocity (Gervais & Katopodis 2013, Di Rocco 2018). The photograph record provided in Appendix A.4 illustrates water level conditions within the channel during April, May and July 2018.

The low flow monitoring event on July 24, 2018 was also conducted by Wood field staff. Diversion channel wetted widths, total depths and water velocity in pools, flats and riffles were measured where possible (Table 5-9) throughout the pre-determined channel stability stations shown on Figure 2-2. No measureable flow was observed within the channel due to intermitent flow conditions. Total depths ranged from 0.02 to 1.2 m within all habitat types, and station CSS-5 near the outlet of West Creek Pond was dry. Figure 5-1 shows a comparison between the 2017 and 2018 Barwick, Ontario monthly precipitation records to the 1981 to 2010 Canadian climate normal for this area, demonstrating the 2018 period of record was drier than 2017 and both years were drier than the normal values.

Fish were found in all sampled channel habitats, further demonstrating the fish are passing through the channel and connectivity is maintained between West Creek Pond and Loslo Creek. This was further substantiated by observations from New Gold and Wood site staff in early May 2018 that confirmed White Sucker were staging to spawn and congregating in the channel reaches between stations CSS-1 and CSS-3 (Appendix A.4; Plate A.4-5).

5.3 Physical Function Monitoring Recommendations

The following recommendations are provided to improve physical function monitoring of the compensation measures:

- Investigate loss of water within Stockpile Pond as this measure will not meet the physical function success criteria until the pond contains normal water levels per the design and pond outflow activates the reach of Stockpile Diversion Channel between the pond outlet and confluence with West Creek Tributary 2.

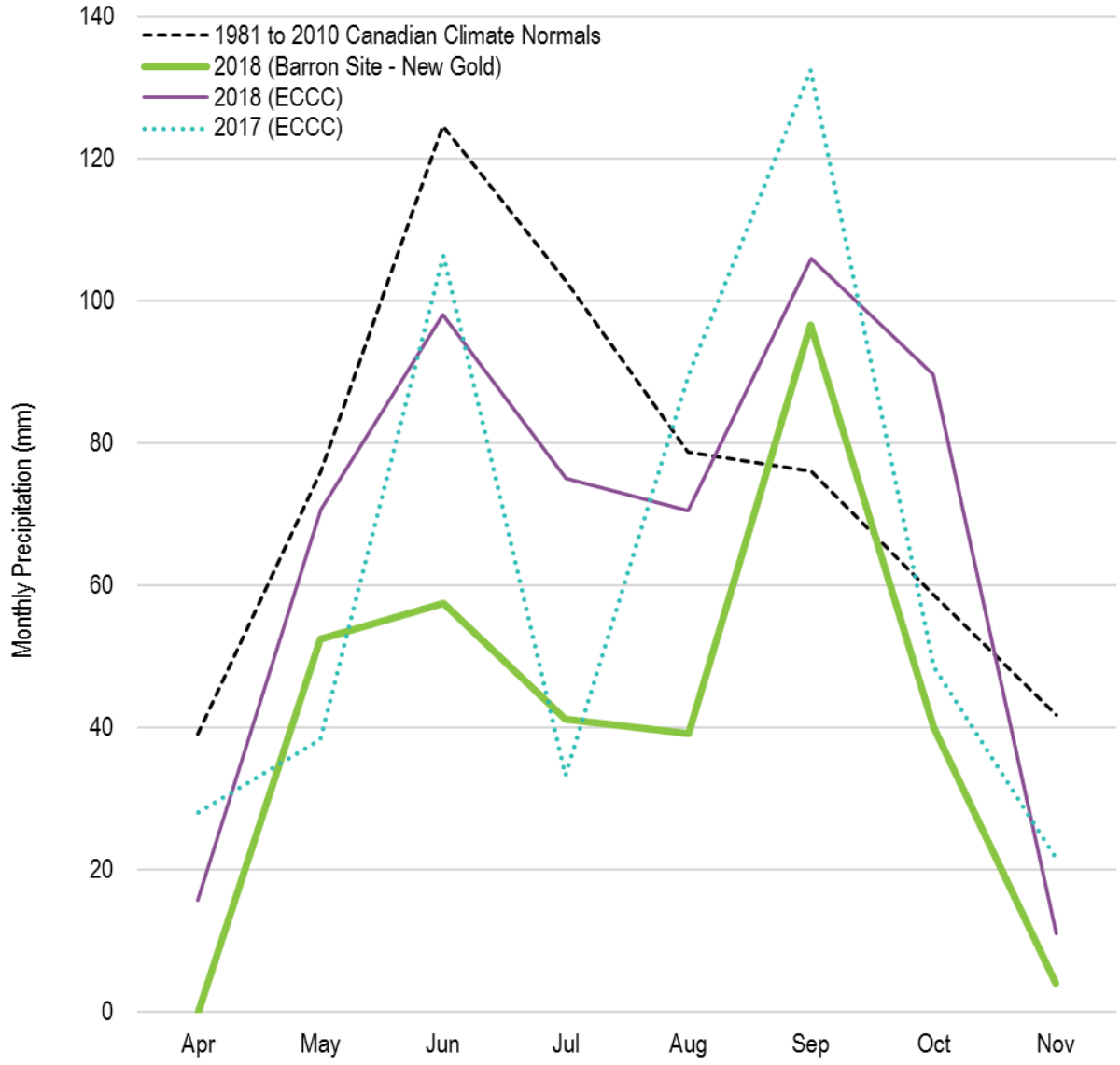

Figure 5-1: Monthly Precipitation Record

Notes:

1. Environment and Climate Change Canada, Barwick Climate Station ID 6020559 monthly precipitation records for 2017, 2018 and the 1981 to 2010 Canadian Climate Normals shown to demonstrate 2017 and 2018 were generally drier than average during the open water period (April to November).
2. Barron Site precipitation data provided by New Gold.

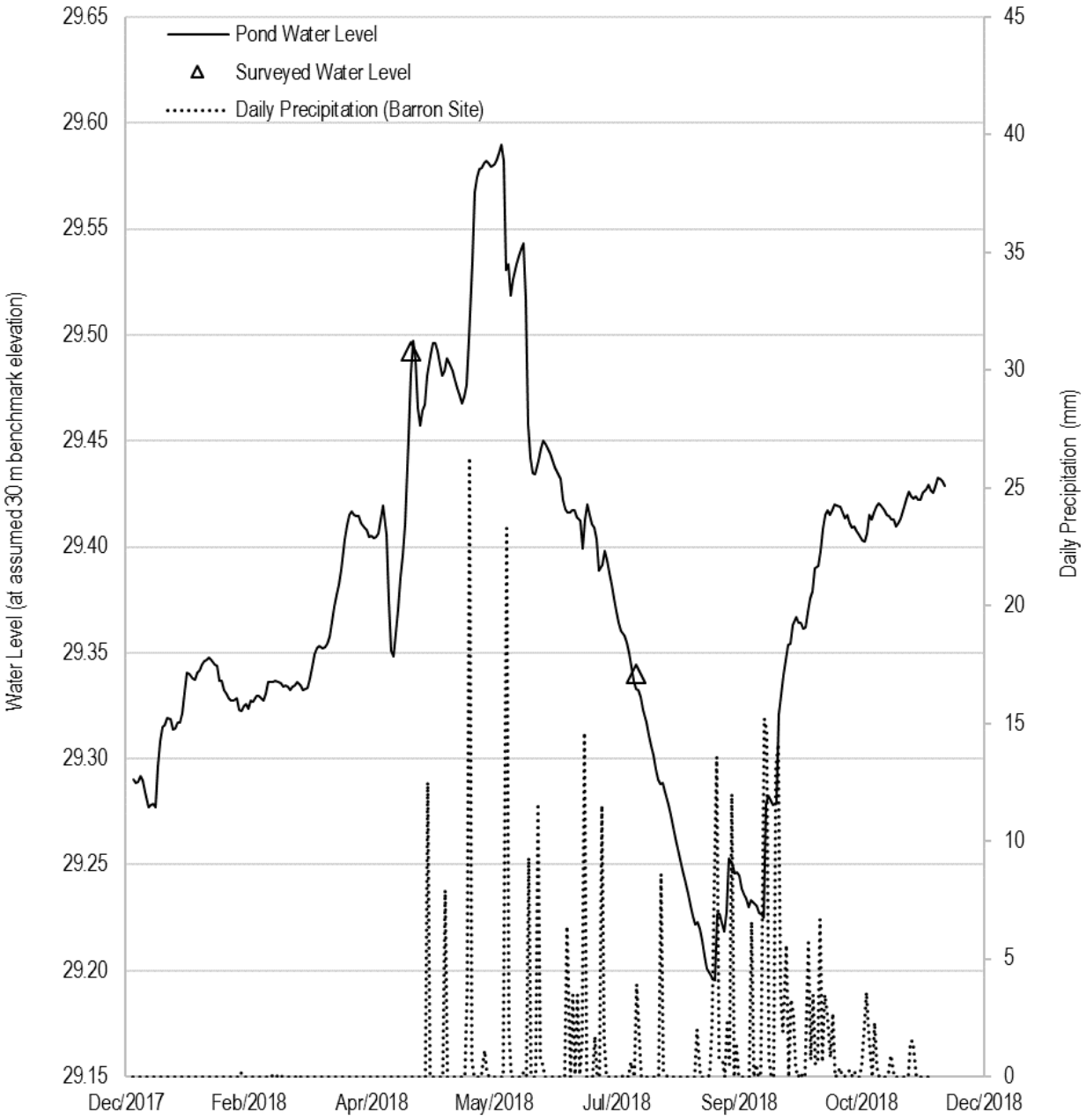

Figure 5-2: Clark Creek Pond Water Level and Survey Data

Notes:

1. Daily precipitation data from Barron Site provided by New Gold.

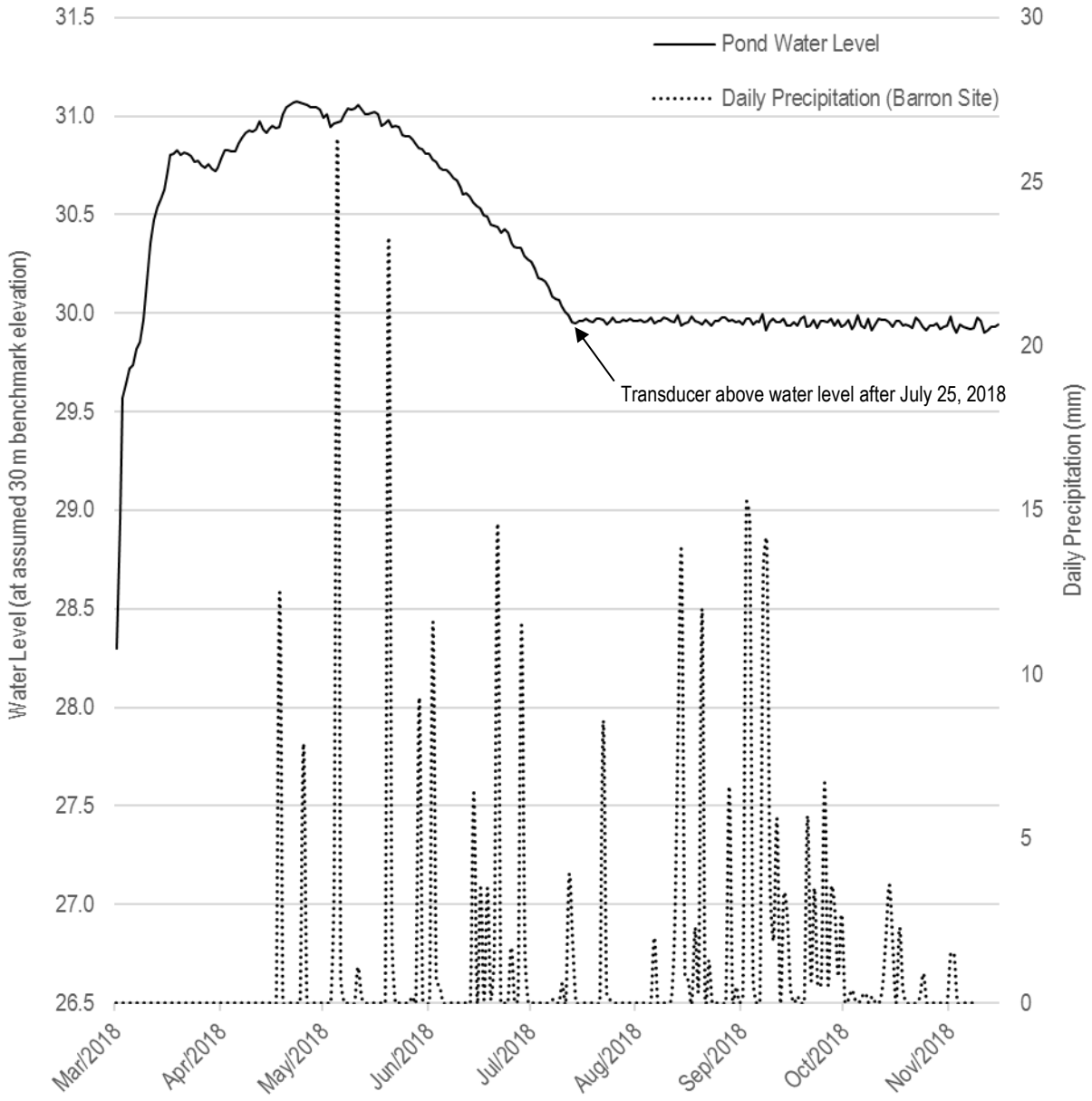

Figure 5-3: Stockpile Pond Water Level Data

Notes:

1. Stockpile Pond water level logger transducer was submerged from approximately March 21 to July 25, 2018.
2. The transducer was above the pond water level after July 25, 2018 as shown by the static level data to the end of this period of record (November 28, 2018).
3. Daily precipitation data from Barron Site provided by New Gold.

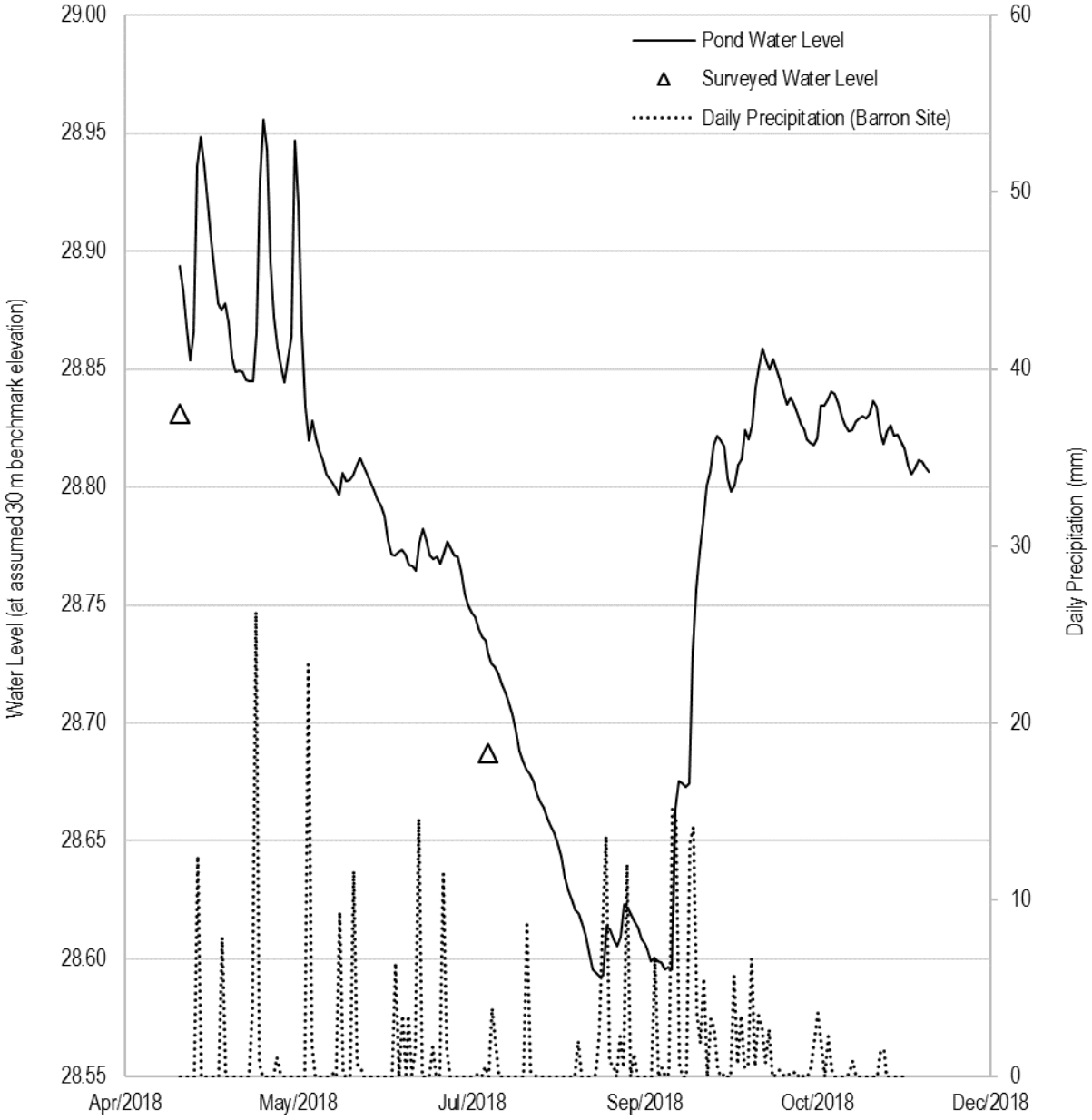

Figure 5-4: West Creek Pond Water Level and Survey Data

Notes:

1. West Creek Pond water level logger installed April 26, 2018.
2. Daily precipitation data from Barron Site provided by New Gold.

Table 5-1: Clark Creek Pond 2018 Water Depth Measurement Summary

Location No.	Design Water Depth (m)	Total Water Depth (m)	UTM Easting (m)	UTM Northing (m)
DP-A-01	0.71	0.83	429640	5410122
DP-A-02	0.68	0.91	429641	5410098
DP-A-03	0.64	1.06	429641	5410067
DP-A-04	0.89	1.67	429644	5410050
DP-A-05	2.34	2.80	429648	5410039
DP-A-06	2.71	2.80	429649	5410030
DP-A-07	2.64	2.50	429646	5410023
DP-A-08	1.65	1.60	429648	5410006
DP-A-09	1.10	1.48	429656	5409985
DP-A-10	0.77	1.00	429662	5409972
DP-A-11	1.63	1.75	429665	5409961
DP-A-12	0.36	0.66	429663	5409942
DP-B-01	1.74	2.00	429634	5409988
DP-B-02	1.69	1.60	429646	5410003
DP-B-03	1.70	2.10	429656	5410016
DP-B-04	2.26	2.10	429673	5410028
DP-B-05	1.46	1.50	429700	5410040
DP-B-06	1.35	1.40	429722	5410051
DP-B-07	1.17	0.95	429739	5410061
DP-B-08	0.60	0.90	429757	5410070
DP-B-09	0.49	1.20	429774	5410075

Notes:

1. Data collected July 28, 2018 by Wood field staff
2. UTM – Universal Transverse Mercator, Zone 15U, NAD 83
3. Locations accurate to approximately 3 metres, design water depth ranges provided per relative sample location within design drawings
4. Appendix C includes as-built conditions of Clark Creek Pond for reference.

Table 5-2: Clark Creek Diversion Channel 2018 High Flow Stability Monitoring Summary

Channel Stability Station ID	Morphology	Wetted Width (m)	Total Depth (m)			Velocity (m/s)			Comments
			Left	Centre	Right	Left	Centre	Right	
CSS-1-1	Pool	14.5	0.17	0.4	0.18	0.005	0.2	0.049	
CSS-1-2	Flat	3.95	0.42	0.44	0.36	0.079	0.224	0.039	
CSS-1-3	Riffle	1.3	0.08	0.028	0.016	0.325	1.313	0.312	Turbulent centre
CSS-1-4	Flat	9.1	0.22	0.24	0.35	0.027	0.144	0.015	
CSS-2-1	Pool	13.5	0.62	0.74	0.8	0.007	0.005	0.022	
CSS-2-2	Flat	11.35	0.31	0.38	0.28	0.022	0.044	0.038	
CSS-2-3	Pool	8.3	0.45	0.5	0.53	0.021	0.048	0.021	
CSS-2-4	Riffle	6.55	0.18	0.3	0.14	0.147	0.153	0.031	
CSS-3-1	Pool	8.8	0.61	0.69	0.73	0.037	0.013	0.034	
CSS-3-2	Riffle	9.5	0.38	0.5	0.34	0.02	0.056	0.018	
CSS-3-3	Pool	6.75	0.64	0.81	0.64	0.004	0.077	0.023	
CSS-3-4	Flat	7.5	0.32	0.39	0.28	0.061	0.062	0.048	

Notes:
1. Data collected April 25, 2018 by Wood field staff
2. Velocity measurements collected using a Marsh McBirney FloMate Model 2000 portable velocity meter

Table 5-3: Clark Creek Diversion Channel 2018 Low Flow Stability Monitoring Summary

Channel Stability Station ID	Morphology	Wetted Width (m)	Total Depth (m)			Velocity (m/s)			Comments
			Left	Centre	Right	Left	Centre	Right	
CSS-1-1	Riffle	2.6	0.11	0.14	0.08	0	0	0	No measurable flow
CSS-1-2	Flat	7.8	0.11	0.11	0.10	0	0	0	
CSS-1-3	Flat	2.4	0.08	0.16	0.1	0	0	0	
CSS-2-1	Pool	13.6	0.61	0.53	0.27	0	0	0	
CSS-2-2	Riffle	9.5	0.10	0.22	0.14	0	0	0	
CSS-2-3	Pool	10.1	0.39	0.31	0.25	0	0	0	
CSS-3-1	Pool	6.6	0.38	0.40	0.33	0	0	0	
CSS-3-2	Riffle	5.1	0.04	0.18	0.08	0	0	0	
CSS-3-3	Pool	7.0	0.35	0.49	0.50	0	0	0	

Notes:
1. Data collected July 24, 2018 by Wood field staff
2. Velocity measurements collected using a Marsh McBirney FloMate Model 2000 portable velocity meter

Table 5-4: Stockpile Pond 2018 Water Depth Measurement Summary

Location No.	Design Water Depth (m)	Total Water Depth (m)	UTM Easting (m)	UTM Northing (m)	Comments
DP-A-01	3.6	0.82	427001	5410721	
DP-A-02	3.7	0.9	427009	5410728	
DP-A-03	3.8	1.56	427017	5410741	
DP-A-04	4.6	3.2	427028	5410751	
DP-A-05	4.4	3.1	427044	5410755	
DP-A-06	5.0	2.1	427064	5410755	
DP-A-07	4.9	1.7	427076	5410753	
DP-A-08	4.6	1.1	427102	5410760	
DP-A-09	5.2	1.9	427120	5410771	
DP-A-10	3.8	0.8	427140	5410784	
DP-A-11	3.6	0	427155	5410792	Beaver dam
DP-A-12	3.9	0.7	427163	5410796	
DP-A-13	3.6	0.4	427186	5410796	
DP-A-14	3.3	0.3	427195	5410805	
DP-A-15	3.3	0.2	427210	5410812	
DP-A-16	3.4	0.59	427219	5410817	
DP-A-17	3.6	0.6	427229	5410821	
DP-B-01	4.0	1.6	427163	5410789	
DP-B-02	4.0	1.2	427162	5410798	
DP-B-03	4.0	1.1	427156	5410808	
DP-B-04	3.7	0.7	427153	5410817	
DP-B-05	3.2	0.4	427152	5410824	

Notes:

1. Data collected July 29, 2018 by Wood field staff
2. UTM – Universal Transverse Mercator, Zone 15U, NAD 83
3. Locations accurate to approximately 3 metres, design water depth ranges provided per relative sample location within design drawings
4. Appendix C includes as-built conditions of Stockpile Pond for reference.

Table 5-5: Stockpile Diversion Channel 2018 High Flow Stability Monitoring Summary

Channel Stability Station ID	Morphology	Wetted Width (m)	Total Depth (m)			Velocity (m/s)			Comments
			Left	Centre	Right	Left	Centre	Right	
CSS-6-1	Riffle	1	0.04	0.08	0.08	0.483	0.711	0.466	
CSS-6-2	Pool	2.35	0.4	0.48	0.32	-0.05	0.028	0.212	Main flow at right
CSS-6-3	Run	1.5	0.24	0.12	0.14	0.004	0.422	0.019	
CSS-6-4	Riffle	0.75	0.06	0.08	0.05	0.573	0.672	0.275	
CSS-6-5	Pool	1.95	0.54	0.57	0.31	0.132	0.053	0.007	
CSS-6-6	Run	2.25	0.18	0.27	0.2	0.021	0.104	0.06	
CSS-7-1	Run	2.3	0.18	0.19	0.17	0.017	0.112	0.061	
CSS-7-2	Riffle	0.76	0.04	0.08	0.06	0.34	0.593	0.332	
CSS-7-3	Run	1.7	0.22	0.3	0.18	0.008	0.132	0.055	
CSS-7-4	Pool	2.5	0.4	0.56	0.53	0.001	0.071	0.076	
CSS-7-5	Riffle	0.7	0.06	0.07	0.04	0.833	0.698	0.228	
CSS-7-6	Pool	1.9	0.4	0.44	0.31	0.044	0.026	0.033	
CSS-7-7	Riffle	0.8	0.11	0.14	0.09	0.179	0.556	0.564	
CSS-8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Dry conditions

Notes:
1. Data collected April 24, 2018 by Wood field staff
2. N/A – value not able to be recorded
3. Velocity measurements collected using a Marsh McBirney FloMate Model 2000 portable velocity meter

Table 5-6: Stockpile Diversion Channel 2018 Low Flow Stability Monitoring Summary

Channel Stability Station ID	Morphology	Wetted Width (m)	Total Depth (m)			Velocity (m/s)			Comments
			Left	Centre	Right	Left	Centre	Right	
CSS-6-1	Pool	3.7	0.86	0.76	0.81	0	0	0	No measurable flow
CSS-6-2	Riffle	2.4	0.26	0.35	0.28	0	0	0	
CSS-6-3	Run	2.95	0.62	0.51	0.54	0	0	0	
CSS-7	Pool	5.05	0.27	0.24	0.18	0	0	0	
CSS-8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Dry conditions

Notes:
1. Data collected July 24, 2018 by Wood field staff
2. N/A – value not able to be recorded
3. Velocity measurements collected using a Marsh McBirney FloMate Model 2000 portable velocity meter

Table 5-7: West Creek Pond 2018 Water Depth Measurement Summary

Location No.	Design Water Depth (m)	Total Water Depth (m)	UTM Easting (m)	UTM Northing (m)	Comments
DP-A-01	0.8	0.7	425741	5411118	Near dam
DP-A-01	2.1	1.3	425761	5411118	
DP-B-01	1.0	1.0	425858	5411236	WCP diversion outlet
DP-B-02	2.2	2.1	425866	5411218	
DP-B-03	1.7	0.9	425885	5411201	
DP-B-04	1.4	1.6	425901	5411183	
DP-B-05	3.1	3.3	425934	5411164	
DP-B-06	3.4	4.6	425950	5411153	Mid-pond refuge
DP-B-07	3.5	3.2	425962	5411138	
DP-B-08	1.3	1.0	425991	5411121	
DP-B-09	0.7	0.3	426007	5411107	SE bank
DP-B-10	0.9	1.8	426121	5411397	Stockpile diversion outlet
DP-B-11	0.7	1.2	426087	5411352	
DP-B-12	1.2	1.9	426067	5411339	
DP-B-13	1.9	2.6	426034	5411296	
DP-B-14	2.1	2.4	426013	5411272	
DP-B-15	2.5	2.2	425999	5411201	
DP-B-16	2.5	2.1	425989	5411181	
DP-B-17	2.8	2.8	425976	5411168	
DP-B-18	3.2	3.2	425936	5411136	
DP-B-19	2.9	3.0	425919	5411125	
DP-B-20	3.9	4.0	425899	5411120	
DP-B-21	3.9	3.8	425880	5411116	
DP-B-22	4.0	4.5	425861	5411114	Deep area closer to dam
DP-B-23	3.6	4.2	425837	5411113	
DP-B-24	4.3	4.0	425813	5411114	
DP-B-25	3.9	4.0	425791	5411117	
DP-B-26	2.8	2.4	425772	5411120	
DP-B-27	1.6	1.4	425755	5411117	
DP-B-28	0.8	0.8	425737	5411120	At dam

Notes:

1. Data collected July 29, 2018 by Wood field staff
2. UTM – Universal Transverse Mercator, Zone 15U, NAD 83
3. Locations accurate to approximately 3 metres, design water depth ranges provided per relative sample location within design drawings
4. Appendix C includes as-built conditions of West Creek Pond for reference.

Table 5-8: West Creek Diversion Channel 2018 High Flow Stability Monitoring Summary

Channel Stability Station ID	Morphology	Wetted Width (m)	Total Depth (m)			Velocity (m/s)			Comments
			Left	Centre	Right	Left	Centre	Right	
CSS-1-1	Riffle	5.95	0.14	0.36	0.2	0.175	0.2	0.201	
CSS-1-2	Riffle	5.4	0.19	0.37	0.31	0.068	0.251	0.043	
CSS-1-3	Run	5.6	0.64	0.56	0.46	0.195	0.29	0.102	
CSS-1-4	Pool	6.15	0.37	0.52	0.42	0.003	0.257	0.105	
CSS-1-5	Run	5.4	0.48	0.5	0.55	0.12	0.319	0.268	
CSS-1-6	Pool	7.3	0.42	0.66	0.42	0.107	0.173	0.08	
CSS-2-1	Riffle	2.8	0.12	0.25	0.13	0.675	0.6663	0.288	
CSS-2-2	Run	3.1	0.24	0.47	0.28	0.129	0.227	0.03	
CSS-2-3	Pool	3.33	0.3	0.71	0.42	0.02	0.261	0.047	
CSS-2-4	Run	3.2	0.31	0.38	0.35	0.109	1.121	-0.066	Centre turbulent
CSS-2-5	Riffle	2.15	0.16	0.26	0.14	0.66	0.959	0.754	
CSS-2-6	Pool	4.05	0.36	0.64	0.32	0.133	0.185	0.062	
CSS-3-1	Riffle	7.1	0.36	0.41	0.3	0.093	0.134	0.1	
CSS-3-2	Run	6	0.46	0.81	0.52	0.02	0.05	0.05	
CSS-3-3	Pool	5.9	0.35	0.59	0.41	0.02	0.085	0.016	
CSS-3-4	Riffle	6.5	0.22	0.32	0.22	0.151	0.05	0.326	
CSS-4-1	Run	2.8	0.24	0.32	0.2	0.278	0.288	0.194	
CSS-4-2	Pool	3.4	0.39	0.6	0.36	0.018	0.244	0.108	
CSS-4-3	Riffle	1.7	0.12	0.2	0.08	0.277	0.66	0.503	
CSS-4-4	Run	2.45	0.2	0.3	0.3	0.355	0.29	0.179	
CSS-4-5	Pool	3.6	0.33	0.35	0.22	0.081	0.202	-0.018	
CSS-4-6	Riffle	1.7	0.06	0.15	0.1	0.656	0.833	0.675	
CSS-5-1	Riffle	5.75	0.08	0.27	0.06	0.143	0.417	0.062	
CSS-5-2	Run	5.7	0.2	0.14	0.66	0.056	0.085	0.149	Deep channel at right
CSS-5-3	Run	6.3	0.12	0.36	0.11	0.24	0.405	0.015	
CSS-5-4	Pool	7.34	0.17	0.7	0.34	0.157	0.018	0	
CSS-5-5	Riffle	5.6	0.13	0.24	0.16	0.393	0.614	0.53	
CSS-5-6	Pool	3.5	0.6	0.74	0.47	0.109	0.184	0.114	

Notes:

1. Data collected April 24, 2018 by Wood field staff
2. Velocity measurements collected using a Marsh McBirney FloMate Model 2000 portable velocity meter

Table 5-9: West Creek Diversion Channel 2018 Low Flow Stability Monitoring Summary

Channel Stability Station ID	Morphology	Wetted Width (m)	Total Depth (m)			Velocity (m/s)			Comments
			Left	Centre	Right	Left	Centre	Right	
CSS-1-3	Run	2.37	0.13	0.14	0.05	0	0	0	No measurable flow
CSS-2-1	Riffle	0.82	0.04	0.03	0.02	0	0	0	
CSS-2-2	Run	0.96	0.105	0.09	0.08	0	0	0	
CSS-2-3	Pool	2.48	0.29	0.2	0.165	0	0	0	
CSS-3-2	Run	4.35	0.25	0.49	0.29	0	0	0	
CSS-3-3	Pool	7.9	0.9	1.2	0.76	0	0	0	
CSS-4	Pool	5.45	0.645	0.88	0.79	0	0	0	

Notes:

1. Data collected July 24, 2018 by Wood field staff
2. Velocity measurements collected using a Marsh McBirney FloMate Model 2000 portable velocity meter

6.0 Stability of Structures

Performance monitoring of the sturcture stability included a dedicated site assessment between July 24 and 29, 2018, as well as opportunistic observations throughout the year by on site staff to document vegetation cover and plantings, repair activities and general condition as able. Observations of the compensation measures stability were conducted during the low flow monitoring period as this timing provided the best visibility to assess whether the constructed features were in place and functional. Photo vantage points were established along the perimeter of the ponds and along the diversion channels to document stability of these features at consistent locations (Appendix B).

6.1 Clark Creek Diversion

All of the Clark Creek Diversion constructed habitat features were observed to remain in place and more than 80% of shorelines and graded offset features are considered stable. Riparian vegetation and cover plantings have achieved more than 80% coverage. As such, the compensation measures have achieved the stability of structures success criteria specified in the approved FHCP as discussed in detail below.

6.1.1 Clark Creek Pond

Photo stations P1 and P2 were established to document the nearshore areas and open-water habitat of Clark Creek Pond (Figure 2-1). Appendix B (Plates B.1-1 and B.1-2) provides photographs of these stations and the constructed habitat features during high and low flow monitoring events to show changes in water level and vegetation cover.

The shoreline, as well as the observed constructed habitat features (tree piles and boulder clusters) appeared (where visible) to remain in place as identified in the As-Constructed report. Most boulder clusters and some tree piles were submerged, with one exposed boulder pile near the southern region of the pond and three emergent tree piles positioned near the southern, northern and eastern extents of the pond. The nearshore partly exposed tree piles are meant to provide subsurface fish habitat, as well as perching areas for avian wildlife and basking structures suitable for turtles and other herptiles. All observed shorelines and graded offset features were stable and not eroding, thereby meeting the success criteria of greater than 80% of features are considered stable. Riparian vegetation was well established at most areas surrounding Clark Creek Pond, with no areas of concern identified. Overall, these areas have greater than 90% vegetation cover, which meet the success criteria of greater than 80% coverage identified within the approved FHCP.

6.1.2 Clark Creek Diversion Channel

Photo stations P3, P4 and P5 and channel stability stations CSS-1, CSS-2 and CSS-3 were established to document stability of the Clark Creek Diversion Channel (Figure 2-1). Appendix B (Plates B.1-3 to B.1-5) provides photographs of these stations and the constructed habitat features during high and low flow monitoring events to show changes in water level and vegetation cover.

The shallow conditions observed during the low flow monitoring event are considered typical during periods of intermittency, and 2018 represented drier than average conditions (Figure 6-1). Due to the low gradient design, much of the Clark Creek Diversion Channel contained water in pool and flat morphology, despite drier than average conditions. The rock riffle in CSS-1 was dry at the time of observation on July 24, 2018. This feature had less than 0.01 m water depth at the time of assessment, thereby posing a potential barrier to fish passage during extended periods of low precipitation and limited or no outflow

from Clark Creek Pond. Additionally, beaver activity was observed directly upstream of the rock riffle in CSS-1, which posed a partial fish barrier to fish. Beaver dams are natural components of the creak system and regularly result in partial obstructions to fish movement. No evidence of erosion was observed within the diversion channel, meaning the channel has met the success criteria and that greater than 80% of the channel is considered stable. Riparian vegetation was well established at most areas along the Clark Creek Diversion Channel, with no areas of concern identified. Overall, the diversion channel has greater than 90% vegetation cover, which meet the success criteria of greater than 80% coverage identified within the approved FHCP.

6.2 West Creek Diversion

The West Creek Diversion compensation measures have achieved the stability of structures success criteria specified in the approved FHCP. Even though Stockpile Pond has not filled with water to the design water level, and a section of the Stockpile Diversion Channel does not receive outflow from the pond, the constructed habitat features are in place, more than 80% of shorelines and graded offset features are considered stable and riparian vegetation and cover plantings have more than 80% coverage. Future performance monitoring activites will confirm continued stability of these stuctures. The following sections provide further details regarding the stability of each West Creek Diversion compensation measure.

6.2.1 Stockpile Pond

Photo station P14 was established to document the nearshore areas and open-water habitat of Stockpile Pond (Figure 2-2). Appendix B (Plates B.2-5 and B.2-6) provides photographs of this station and the constructed habitat features during high and low flow monitoring events to show changes in water level and vegetation cover.

The shoreline, as well as the observed constructed habitat features (tree piles and boulder clusters) appeared to remain in place as identified in the As-Constructed report. Many of the boulder clusters and tree piles were exposed, due to low water level elevation within the pond during the July 2018 monitoring event. All observed shorelines and graded offset features were stable and not eroding, thereby meeting the success criteria of greater than 80% of features are considered stable. Riparian vegetation was well established at most areas surrounding Stockpile Pond, with no areas of concern identified. Overall, these areas have greater than 90% vegetation cover, which meet the success criteria of greater than 80% coverage identified within the approved FHCP.

6.2.2 Stockpile Diversion Channel

Photo stations P11, P12 and P13 and channel stability stations CSS-6, CSS-7 and CSS-8 were established to document stability of the diversion channel (Figure 2-2). Appendix B (Plates B.2-1 to B.2-4) provides photographs of these stations and the constructed habitat features during high and low flow monitoring events to show changes in water level and vegetation cover.

The shallow conditions observed during the low flow monitoring event are considered typical during periods of intermittency, and 2018 represented drier than average conditions (Figure 6-1). Due to the lack of outflow from Stockpile Pond or West Creek Tributary 2 inflow, much of the Stockpile Diversion Channel was dry during the low flow monitoring event. Consequently, only isolated pools and flat sections contained water. Some evidence of localized erosion was observed within the diversion channel but overall the channel has met the success criteria and that greater than 80% of the channel is considered

stable. Riparian vegetation was well established at most areas along the Stockpile Diversion Channel, some spares areas noted near the CSS-7 station. Overall, the diversion channel has greater than 80% vegetation cover, which achieves the success criteria identified within the approved FHCP.

6.2.3 West Creek Pond

Photo stations P8, P9 and P10 were established to document the nearshore areas and open-water habitat of West Creek Pond (Figure 2-2). Appendix B (Plates B.3-10 and B.3-12) provides photographs of these stations and the constructed habitat features during high and low flow monitoring events to show changes in water level and vegetation cover.

The shoreline, as well as the observed constructed habitat features (tree piles and boulder clusters) appeared (where visible) to remain in place as identified in the As-Constructed report. Most boulder clusters and some tree piles were submerged. The exposed tree piles are meant to provide subsurface fish habitat, as well as perching areas for avian wildlife and basking structures suitable for turtles and other herptiles. All observed shorelines and graded offset features were stable and not eroding, thereby meeting the success criteria of greater than 80% of features are considered stable. Riparian vegetation was well established at most areas surrounding West Creek Pond, with no areas of concern identified. Overall, these areas have greater than 90% vegetation cover, which meet the success criteria of greater than 80% coverage identified within the approved FHCP.

6.2.4 West Creek Diversion Channel

Photo stations P1 to P7 and channel stability stations CSS-1 to CSS-5 were established to document stability of the West Creek Diversion Channel (Figure 2-2). Appendix B (Plates B.3-1 to B.3-9) provide photographs of these stations and the constructed habitat features during high and low flow monitoring events to show changes in water level and vegetation cover.

The shallow conditions observed during the low flow monitoring event are considered typical during periods of intermittency, and 2018 represented drier than average conditions (Figure 6-1). Due to the lack of outflow from West Creek Pond, the upper reaches of West Creek Diversion Channel were dry during the low flow monitoring event. The mid and lower reaches contained water in all habitat types, but no measurable flow. No evidence of erosion was observed within the diversion channel, meaning the channel has met the success criteria and that greater than 80% of the channel is considered stable. Riparian vegetation was well established at most areas along the West Creek Diversion Channel, with no areas of concern identified. Overall, the diversion channel has greater than 90% vegetation cover, which meet the success criteria of greater than 80% coverage identified within the approved FHCP.

6.3 Structure Stability Monitoring Recommendations

The Clark Creek and West Creek Diversions are meeting or are on track to achieve the performance monitoring success criteria. The year-two performance monitoring studies will assess Stockpile Pond and additional measures may be taken if required to increase water levels.

7.0 Fish Community Metrics

The year-one fish community performance monitoring results show the physical habitat supports all life history stages for the fish species present. These results indicate that the compensation measures are progressing as expected for achieving all success criteria by year-five of the monitoring program.

Fish community sampling was conducted during July 2018, using non-lethal fish collection methods including; minnow traps, seine net and a backpack electrofishing as specified in the approved FHCP. Sampling efforts met or exceeded the minimum gear-specific requirements as specified in Table 7 of the approved FHCP performance monitoring criteria for pond and diversion channel habitats (New Gold 2017). These sampling activities documented species presence, relative abundance and confirmed presence of multiple fish life stages for some species. Fish community results are discussed below for each compensation measure habitat type. The detailed gear-specific results and comparison of year-one Clark Creek, Stockpile and West Creek ponds and diversion channel performance monitoring results to the approved FHCP success criteria are discussed below.

7.1 Clark Creek Diversion

The Clark Creek Diversion fish community results show multiple year classes of several species were present, a total of seven fish species were documented and the seine net fish community abundance success metric was achieved. Other gear-specific catch results show fish abundance is on track to achieving all success criteria by year-five of the monitoring program, as discussed below.

7.1.1 Clark Creek Pond Fish Community Monitoring Results

A summary of the Clark Creek Pond fish species caught during the 2018 field studies is provided in Table 7-1, with gear-specific and catch-per-unit effort (CPUE) results in Table 7-2. Seven fish species were documented in Clark Creek Pond during the 2018 studies. Northern Redbelly Dace and Finescale Dace were the most abundant species, followed by Pearl Dace and Brook Stickleback. Many young-of-the-year (YOY) individuals were encountered, which were likely members of the Phoxinus genus but were too small to non-lethally confirm species (e.g., likely Finescale Dace, Northern Redbelly Dace, or hybrids of these species). Most fish were captured in baited minnow traps or by the fine mesh seine net. The majority of seine net catch were YOY individuals (93% of catch), representing approximately 45% of the cumulative total catch from all gear types in the pond (Table 7-2). Consequently, the high proportion of YOY individuals within Clark Creek Pond influenced the CPUE of the gear-specific catch results since those smaller individuals were only catchable using seine netting.

A subsample of individuals from each species and from each gear type were measured for fork or total length for those species with rounded caudal fins (e.g., Brook Stickleback and Central Mudminnow). Species-specific results of these measurements, where a minimum of 100 individuals were measured, are shown on Figure 7-1 illustrating multiple age classes of Brassy Minnow, Brook Stickleback, Finescale Dace, Northern Redbelly Dace and Pearl Dace were present. These results confirm that Clark Creek Pond functions as overwintering and summer refuge, spawning, rearing and foraging habitat for these species.

7.1.2 Clark Creek Diversion Channel Fish Community Monitoring Results

Pool, flat and riffle habitats were sampled using minnow traps and backpack electrofishing; however, no measurable flow was observed within the channel and no outflow from Clark Creek Pond was noted. Fish within the diversion channel did however have unimpeded access to Teeple Pond. A summary of the Clark

Creek Diversion Channel fish species caught during the 2018 field studies is provided in Table 7-1, with gear-specific and CPUE results in Table 7-2. Three fish species were documented in Clark Creek Diversion Channel during the 2018 studies. Northern Redbelly Dace and unidentified YOY (likely Phoxinus species) represented 92% of the total cumulative catch. Central Mudminnow and Brook Stickleback were also caught in the diversion channel (Table 7-2). Minnow trapping captured all Northern Redbelly Dace and two Central Mudminnow. Electrofishing captured the remaining Central Mudminnow, all Brook Stickleback and all YOY cyprinids. Body size of the YOY individuals precluded their capture within the minnow traps since they could freely swim through the mesh size.

7.2 West Creek Diversion

The West Creek Diversion fish community sampling results show multiple year classes of several species were present, a total of twelve fish species were documented and the seine net fish community abundance success metric was achieved Other gear-specific catch results show fish abundance is on track to achieving all success criteria by year-five of the monitoring program, as discussed below.

7.2.1 Stockpile Pond Fish Community Monitoring Results

A summary of the Stockpile Pond fish species caught during the 2018 field studies is provided in Table 7-3, with gear-specific and CPUE results in Table 7-4. Eleven fish species were documented in Stockpile Pond during the 2018 studies. Brown Bullhead, Northern Redbelly Dace, Finescale Dace and Creek Chub were the most abundant species, followed by Brook Stickleback, Pearl Dace and Brassy Minnow. Many YOY individuals were encountered, which were likely members of the Phoxinus genus but were too small to non-lethally confirm species (e.g., likely Finescale Dace, Northern Redbelly Dace, or hybrids of these species). Most fish older than YOY were caught in baited minnow traps, whereas the majority of seine net catch were YOY individuals representing approximately 75% of the cumulative total catch from all gear types within the pond (Table 7-4). Consequently, the high proportion of YOY individuals within Stockpile Pond influenced the CPUE of the gear-specific catch results since those smaller individuals were only catchable using seine netting.

A subsample of individuals from each species and from each gear type were measured for fork or total length for those species with rounded caudal fins. Species-specific results of these measurements, where a minimum of 100 individuals were measured, are shown on Figure 7-2 illustrating multiple age classes of Brassy Minnow, Creek Chub, Finescale Dace, Northern Redbelly Dace and Pearl Dace were present. These results confirm that Stockpile Pond functions as summer refuge, spawning, rearing and foraging habitat for these species.

7.2.2 Stockpile Diversion Channel Fish Community Monitoring Results

Available pool and flat habitats were sampled using minnow traps and backpack electrofishing; however, the riffles were mostly all dry and no measurable flow was observed within the channel. Fish within the lower reach of the diversion channel did however have unimpeded access to West Creek Pond. A summary of the Stockpile Diversion Channel fish species caught during the 2018 field studies is provided in Table 7-3, with gear-specific and CPUE results in Table 7-4. Eight fish species were documented in Stockpile Diversion Channel during the 2018 studies. Brook Stickleback, Creek Chub and juvenile White Sucker represented 84% of the total cumulative catch. Brassy Minnow, Central Mudminnow, Fathead Minnow, Finescale Dace and Pearl Dace were also caught in low abundace within the diversion channel (Table 7-4). Minnow trapping captured nearly 90% of the cumulative catch for both gear types within the

diversion channel. Electrofishing captured individuals from five of the species captured in the minnow traps.

7.2.3 West Creek Pond Fish Community Monitoring Results

A summary of the West Creek Pond fish species caught during the 2018 field studies is provided in Table 7-3, with gear-specific and CPUE results in Table 7-4. Ten fish species were documented in West Creek Pond during the 2018 studies. Pearl Dace and Brassy Minnow were the most abundant species, representing approximately 25% and 10% of the cumulative catch for all gear types within the pond, respectively. Many YOY individuals were encountered, which were likely members of the Phoxinus genus but were too small to non-lethally confirm species. Most fish were captured in baited minnow traps or by the fine mesh seine net. The majority of seine net catch were YOY individuals, representing approximately 45% of the cumulative total catch from all gear types (Table 7-4). Consequently, the high proportion of YOY individuals within West Creek Pond influenced the CPUE of the gear-specific catch results since those smaller individuals were only catchable using seine netting.

A subsample of individuals from each species and from each gear type were measured for fork or total length for those species with rounded caudal fins (e.g., Brook Stickleback and Central Mudminnow). Species-specific results of these measurements, where a minimum of 100 individuals were measured, are shown on Figure 7-3 illustrating multiple age classes of Brassy Minnow, Creek Chub, Fathead Minnow, Northern Redbelly Dace and Pearl Dace were present. These results confirm that West Creek Pond functions as overwintering and summer refuge, spawning, rearing and foraging habitat for these species.

7.2.4 West Creek Diversion Channel Fish Community Monitoring Results

Pool, flat and riffle habitats were sampled using minnow traps and backpack electrofishing; however, no measurable flow was observed within the channel and no outflow from West Creek Pond was noted. The diversion channel upstream reaaches were dry, but the lower reaches maintained sufficient water depth and connectivity to Loslo Creek. A summary of the West Creek Diversion Channel fish species caught during the 2018 field studies is provided in Table 7-3, with gear-specific and CPUE results in Table 7-4. Nine fish species were documented in West Creek Diversion Channel during the 2018 studies. Creek Chub, White Sucker and Brook Stickleback represented 33%, 19% and 14% of the total cumulative catch for both gear types within the diversion channel, respectively (Table 7-4). Minnow trapping captured eight fish species and approximately 52% of the total cumulative catch within the diversion channel. Electrofishing was conducted in other areas of the diversion channel and captured seven speices, one of which (Johnny Darter), which was not captured in the minnow traps.

7.3 Fish Community Monitoring Recommendations

The following recommendations are provided to improve fish community monitoring of the compensation measures:

- Alternate fishing methods such as boat-mounted electrofishing may be considered to improve electrofishing CPUE within the pond habitat since a boat can sample larger areas with similar effort and reach deeper (non-wadable) habitat.

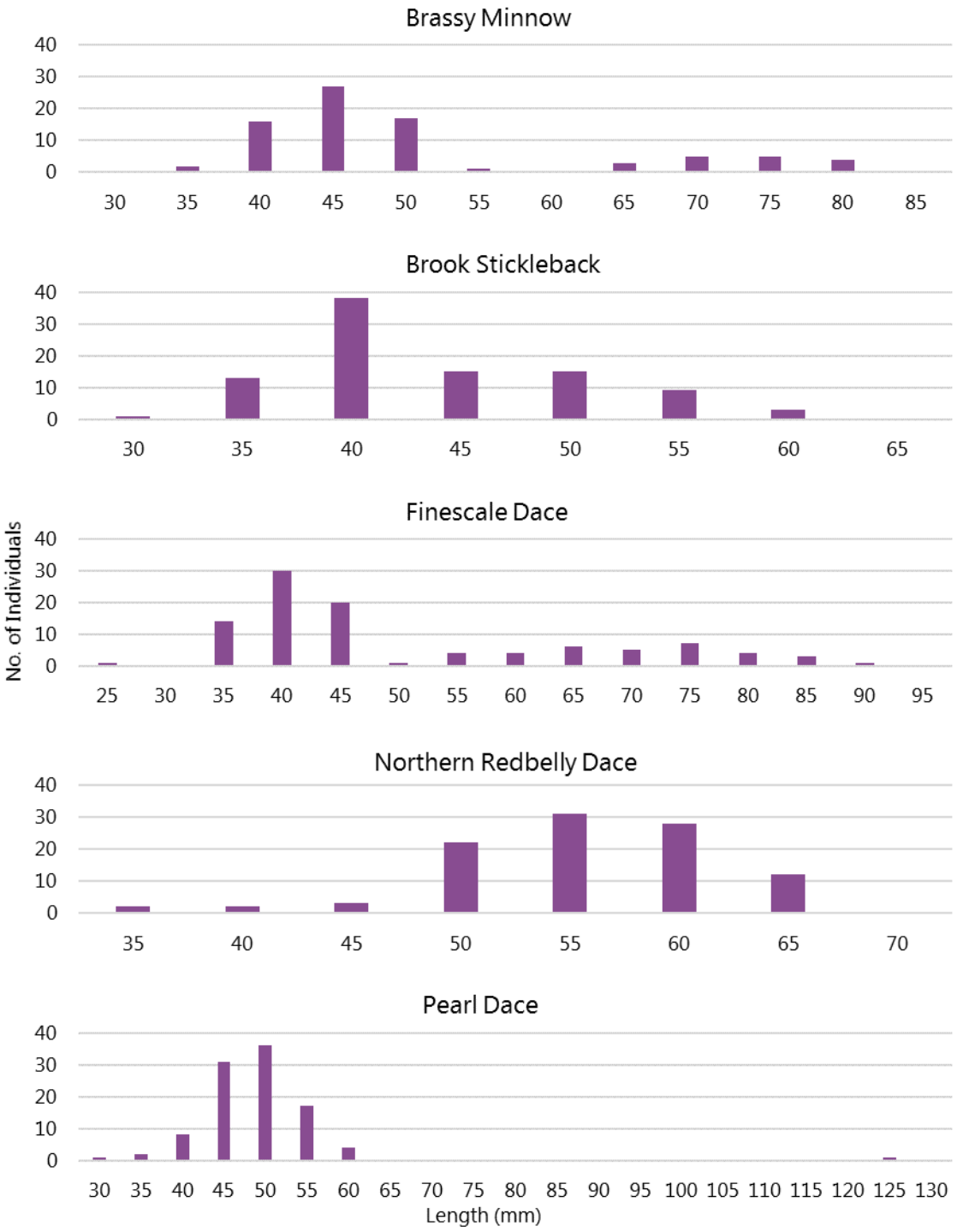

Figure 7-1: Clark Creek Pond Species-Specific Length-Frequency Summary

Note:

1. Brook Stickleback were measured for total length, all other species data represents fork length.

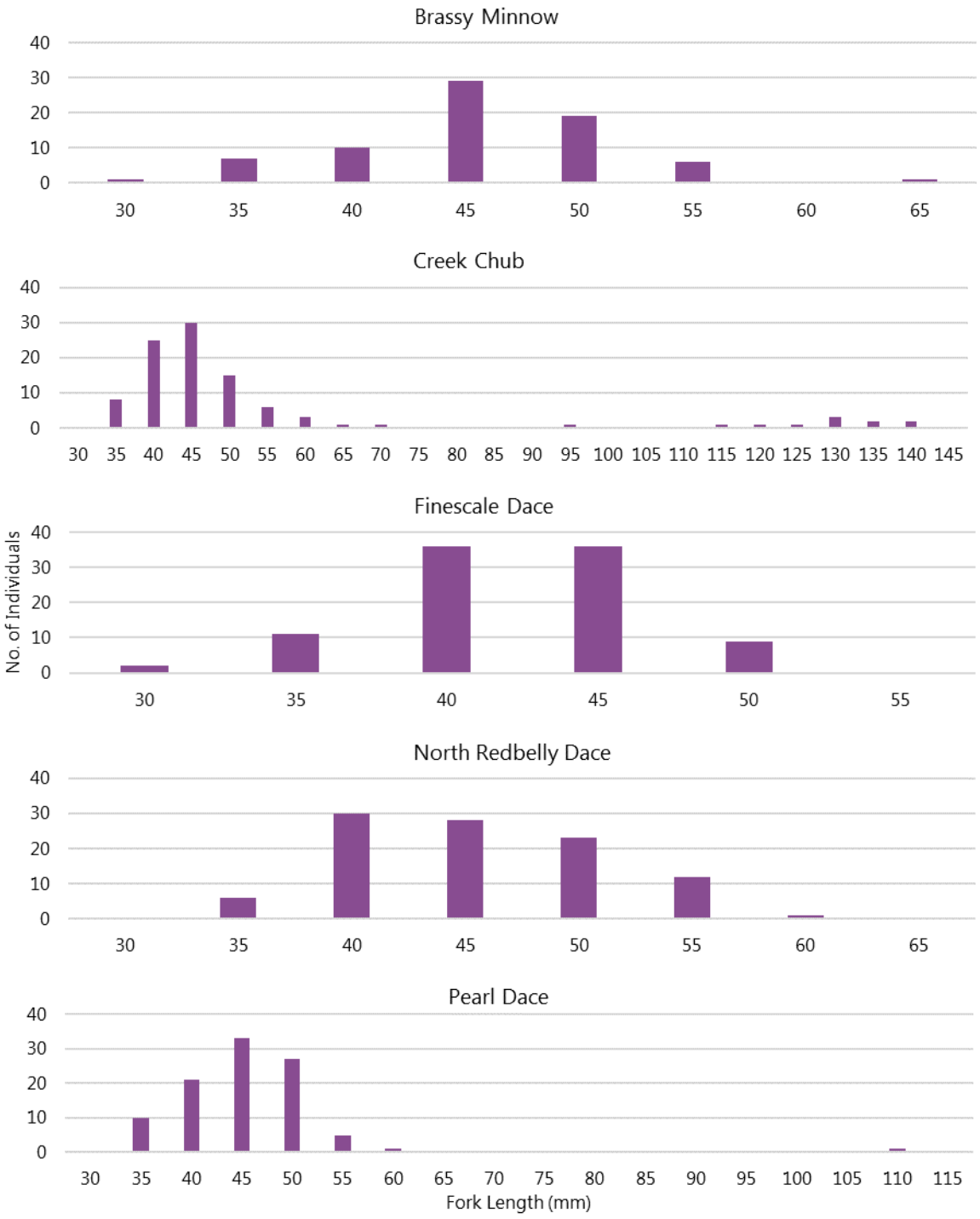

Figure 7-2: Stockpile Pond Species-Specific Length-Frequency Summary

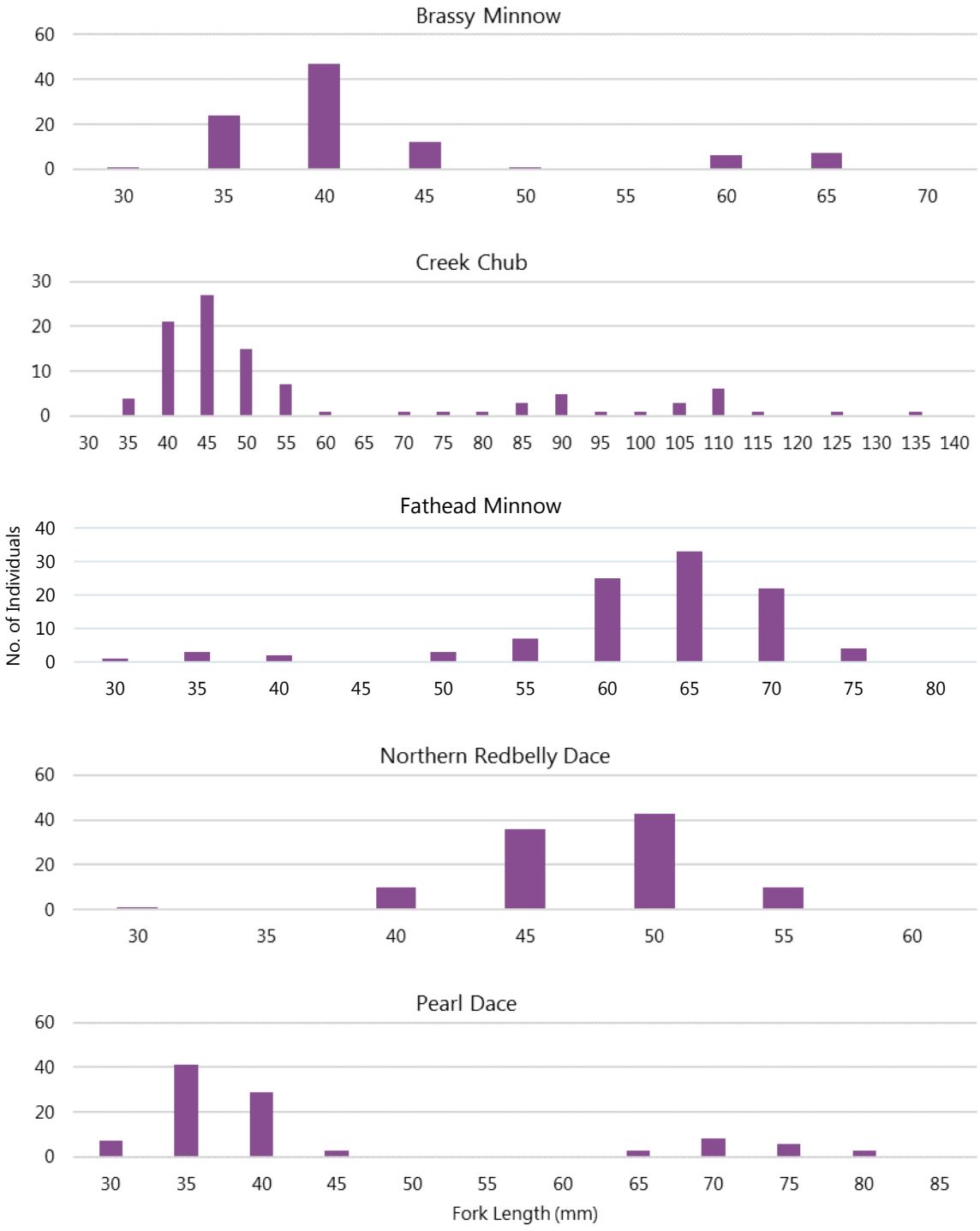

Figure 7-3: West Creek Pond Species-Specific Length-Frequency Summary

Table 7-1: Clark Creek Diversion 2018 Fish Species Presence Summary

Expected Species[1] Clark Creek (Teeple Drain) Sub-watershed	Year-one (2018)		Success Target of 9 Species
	Clark Creek Pond	Clark Creek Diversion Channel	
Blacknose Dace			
Blackside Darter			
Brassy Minnow	**X**		**X**
Brook Stickleback	**X**	**X**	**X**
Central Mudminnow	**X**	**X**	**X**
Common Shiner			
Creek Chub			
Emerald Shiner			
Fathead Minnow[2]	**X**		**X**
Finescale Dace	**X**		**X**
Golden Shiner			
Lake Chub			
Northern Redbelly Dace	**X**	**X**	**X**
Pearl Dace	**X**		**X**
Spottail Shiner			
White Sucker			
Species Richness	**7**	**3**	**7**

Notes:

1. List of expected species from the Fish Habitat No Net Loss Plan Section 35(2) Waterbodies, Table 3-3 (AMEC 2015)
2. Fathead Minnow were not previously listed to occur within the sub-watershed, but were encountered during the year-one performance monitoring studies.

Table 7-2: Clark Creek Diversion – Fish Community Monitoring Results Summary

Gear	Year	Sample ID	Sample Date (dd/mm/yy)	No. of Gear	Total Effort	Species Specific Catch Per Unit Effort (CPUE)								Area Catch Total (n)	Area Catch CPUE	Ultimate (5-year) Target CPUE
						Brassy Minnow	Brook Stickleback	Central Mudminnow	Fathead Minnow	Finescale Dace	Northern Redbelly Dace	Pearl Dace	YOY Cyprinid			
Minnow Trap	2018	CCP-MT1	28/07/18	75	1,775	80	94	56	57	509	826	191	0	**1,813**		
		CP-DC-MT1	26/07/18	13	312	0	0	2	0	0	18	0	0	**20**		
		Gear-Specific Totals			**2,087**	**80**	**94**	**58**	**57**	**509**	**844**	**191**	**0**	**1,833**	**0.88**	**≥ 2**
Seine Net	2018	CCP-SN1	28/07/18	1	10	0	21	0	7	44	42	0	1,605			
		Gear-Specific Totals			**10**	**0**	**21**	**0**	**7**	**44**	**42**	**0**	**1,605**	**1,719**	**172**	**≥ 16**
Electrofishing	2018	CCP-EF1	29/08/18	1	10,028	3	5	19	0	16	0	0	0	**43**		
		CP-DC-EF1	24/07/18	1	1,040	0	7	10	0	0	0	0	0	**17**		
		Gear-Specific Totals			**11,068**	**3**	**12**	**29**	**0**	**16**	**0**	**0**	**0**	**60**	**5.4**	**≥ 44**
2018 All-Gear Catch Total						**83**	**127**	**87**	**64**	**569**	**886**	**191**	**1,605**	**3,612**	**-**	**-**

Notes:

1. CPUE = catch-per-unit-effort, expressed as the number of fish caught per gear-specific effort type
2. Minnow trap effort presented as the number of fish caught per minnow trap hour; FCHP minimum effort required for monitoring (1,500 hours in pond habitat, 250 hours in diversion habitat)
3. Seine net effort presented as the number of fish caught per 15 metre net haul; FHCP minimum effort required for monitoring (10 individual 15 m net hauls; pond habitat only)
4. Backpack electrofishing effort presented as the number of fish caught per 1,000 electrofishing seconds; FCHP minimum effort required for monitoring (10,000 seconds in pond habitat, 1,000 seconds in diversion channel habitat)
5. All gear-specific minimum required efforts were met or exceeded

Table 7-3: West Creek Diversion 2018 Fish Species Presence Summary

Expected Species[1] Clark Creek (Teeple Drain) Sub-watershed	Year-one (2018)				Success Target of 9 Species
	Stockpile Pond	Stockpile Diversion Channel	West Creek Pond	West Creek Diversion Channel	
Blacknose Dace					
Blackside Darter					
Brassy Minnow	X	X	X	X	X
Brook Stickleback	X	X	X	X	X
Brown Bullhead[2]	X				X
Central Mudminnow	X	X	X	X	X
Common Shiner	X		X	X	X
Creek Chub	X	X	X	X	X
Emerald Shiner					
Fathead Minnow[2]	X	X	X	X	X
Finescale Dace	X	X	X		X
Golden Shiner					
Johnny Darter[2]				X	X
Lake Chub					
Northern Redbelly Dace	X		X		X
Pearl Dace	X	X	X	X	X
Spottail Shiner					
White Sucker	X	X	X	X	X
Species Richness	**11**	**8**	**10**	**9**	**12**

Notes:

1. List of expected species from the Fish Habitat No Net Loss Plan Section 35(2) Waterbodies, Table 3-3 (AMEC 2015)
2. Brown Bullhead, Fathead Minnow and Johnny Darter were not previously listed to occur within the sub-watershed, but were encountered during the year-one performance monitoring studies.

Table 7-4: West Creek Diversion 2018 Fish Community Monitoring Results Summary

Gear	Sample ID	Sample Date (dd/mm/yy)	No. of Gear	Total Effort	Species Specific Catch Per Unit Effort (CPUE)													Area Catch Total (n)	Area Catch CPUE	Ultimate (5-year) Target CPUE
					Brassy Minnow	Brook Stickleback	Brown Bullhead	Central Mudminnow	Common Shiner	Creek Chub	Fathead Minnow	Finescale Dace	Johnny Darter	Northern Redbelly Dace	Pearl Dace	White Sucker	YOY Cyprinid			
Minnow Trap	WCP-MT1	26/07/18	75	1,800	540	317	0	0	5	286	185	55	0	286	1,445	0	0	**3,119**		
	WC-DC-MT1	27/07/18	13	318	23	18	0	4	1	37	7	0	0	0	1	19	0	**110**		
	SP-MT1	25/07/18	75	1,650	73	187	504	7	2	215	7	244	0	312	98	22	0	**1,671**		
	SP-DC-MT1	25/07/18	13	328	2	55	0	3	0	37	10	3	0	0	4	24	0	**138**		
	Gear-Specific Totals			**4,096**	**638**	**577**	**504**	**14**	**8**	**575**	**209**	**302**	**0**	**598**	**1,548**	**65**	**0**	**5,038**	**1.2**	**≥ 2**
Seine Net	WCP-SN1	24/07/18	1	10	0	3	0	0	0	1	0	0	0	0	0	0	2550	**2,554**		
	SP-SN1	28/07/18	1	10	0	6	0	0	0	2	1	0	0	19	0	0	5,350	**5,378**		
	Gear-Specific Totals			**20**	**0**	**9**	**0**	**0**	**0**	**3**	**1**	**0**	**0**	**19**	**0**	**0**	**7,900**	**7,932**	**397**	**≥ 16**
Electrofishing	WCP-EF1	24/07/18	1	10,112	0	5	1	0	0	12	0	6	0	0	0	0	0	**24**		
	WC-DC-EF1	29/07/18	1	1,189	0	11	0	14	6	34	0	0	3	0	13	21	0	**102**		
	SP-EF1	28/07/18	1	10,006	0	14	0	18	0	11	3	0	0	8	0	0	0	**54**		
	SP-DC-EF1	25/07/18	1	1,042	0	4	0	0	0	4	1	2	0	0	0	5	16	**32**		
	Gear-Specific Totals			**22,349**	**0**	**34**	**1**	**32**	**6**	**61**	**4**	**8**	**3**	**8**	**13**	**26**	**16**	**212**	**9.5**	**≥ 44**
2018 All-Gear Catch Total					**638**	**620**	**505**	**46**	**14**	**639**	**214**	**310**	**3**	**625**	**1,561**	**91**	**7,916**	**13,182**	**-**	**-**

Notes:

1. CPUE - catch-per-unit-effort, expressed as the number of fish caught per gear-specific effort type
2. Minnow trap effort presented as the number of fish caught per minnow trap hour; FHCP minimum effort required for monitoring (1,500 hours in pond habitat, 250 hours in diversion habitat)
3. Seine net effort presented as the number of fish caught per 15 metre net haul; FHCP minimum effort required for monitoring (10 individual 15 m net hauls; pond habitat only)
4. Backpack electrofishing effort presented as the number of fish caught per 1,000 electrofishing seconds; FHCP minimum effort required for monitoring (10,000 seconds in pond habitat, 1,000 seconds in diversion channel habitat)
5. All gear-specific minimum required efforts were met or exceeded

8.0 Performance Summary

Implementation and effectiveness of the compensation measures are determined by confirming that the ponds and diversion channels have been constructed as per the approved plans and are functioning as intended using the success criteria specified in the approved FHCP and listed in Table 3-1. Biological systems such as Clark Creek, Stockpile and West Creek ponds and diversion channels are dynamic and will likely require several years to develop full biological communities that meet the success criteria; however, the year-one monitoring results show very good progress toward these targets.

The success criteria for physical construction and function of offset measures was achieved for Clark Creek and West Creek Diversions, although the aerial extent of Stockpile Pond and the section of Stockpile Diversion Channel between the pond outlet and West Creek Tributary 2 that have not developed as expected.

Presence of multiple year classes of fish have been demonstrated within Clark Creek and West Creek Diversions and the richness of at least nine fish species has been documented in West Creek Diversion, thereby achieving some species presence (richness) success criteria. Fish species abundance success criteria were achieved for seine netting within Clark Creek and West Creek Diversions; however, the remaining gear-specific CPUE success criteria are not yet achieved.

Further to the above, the fish catch results show thousands of YOY cyprinid individuals (seine netting catch), which will likely substantively improve the species-specific CPUE for each gear type in future studies as these individuals grow and mature into larger, spawning individuals within the population. It is anticipated that the majority of these fish will survive overwinter in refuge pools, and as such will help the population sooner attain the carrying capacity and productivity of this habitat. The 2018 performance monitoring results comparison to success criteria for Clark Creek and West Creek Diversion meaures are summarized in Tables 8-1 and 8-2, respectively.

Table 8-1: Comparison of Performance Monitoring Results to Success Criteria – Clark Creek Diversion

Attribute and Due Date	Success Criteria	Clark Creek Pond (Year-one)	Clark Creek Diversion Channel (Year-one)	Ultimate (5-year) Post Monitoring Success Criteria
Physical Construction of Offset measures (December 31, 2016)	As-built survey demonstrates that measures are constructed as per the approved plans	Yes	Yes	**Achieved**
	Area of replacement habitat is equal to or greater than 3.86 ha	Yes	Yes	**Achieved**
Physical Function of Offset Measures (December 31, 2019)	Water levels are consistent with those specified in the design	Yes	Yes	**Achieved**
	The outlet channel and pond allows for passage of fish	Yes	Yes	**Achieved**
Stability of Structures (December 31, 2019)	Constructed habitat features remain in place (log and boulder structures in place)	Yes	Yes	**Achieved**
	Shorelines and graded offset features are stable and not eroding (greater than 80% of features are considered stable)	100%	100%	**Achieved**
	Riparian vegetation cover and plantings achieve 80% coverage of area, and or survival of planted stock	>90%	>90%	**Achieved**
Species Presence (December 31, 2021)	Minimum of 9 species of fish are present in the offset measure.	7		On track
Full Life Cycle Usage (December 31, 2021)	Multiple year classes including young of the year fish are present in the offset feature.	Yes		**Achieved**
Fish Abundance (December 31, 2021)	Overall Catch per Unit Effort (CPUE) for all species combined, for at least two of following capture methods (electrofishing, Minnow Traps, Seine Nets). Minimum success criteria are:			On track
	Minnow Trap CPUE ≥ 2 fish per trap hour	0.88		On track
	Seine Net CPUE ≥ to 16 fish per 15 m net pull	172		**Achieved**
	Electrofishing CPUE ≥ 44 fish per 1,000 seconds	5.4		On track

Notes:

1. CPUE = catch-per-unit-effort, expressed as the number of fish caught per gear-specific effort type
2. Achieved = planned success criteria already achieved
3. On track = within the expected progress for the performance monitoring period
4. High proportion of YOY individuals influenced CPUE of gear-specific results since those fish were only catchable using seine netting

Table 8-2: Comparison of Performance Monitoring Results to Success Criteria – West Creek Diversion

Attribute and Due Date	Success Criteria	Ponds (Year-one)	Diversion Channels (Year-one)	Ultimate (5-year) Post Monitoring Success Criteria
Physical Construction of Offset measures (December 31, 2016)	As-built survey demonstrates that measures are constructed as per the approved plans	Yes	Yes	**Achieved**
	Area of replacement habitat is equal to or greater than 21.7 ha	Yes	Yes	**Achieved**
Physical Function of Offset Measures (December 31, 2019)	Water levels are consistent with those specified in the design	No	Approx. 75%	On track
	The outlet channel and pond allows for passage of fish	No	Approx. 75%	On track
Stability of Structures (December 31, 2019)	Constructed habitat features remain in place (log and boulder structures in place)	Yes	Yes	**Achieved**
	Shorelines and graded offset features are stable and not eroding (greater than 80% of features are considered stable)	>90%	>90%	**Achieved**
	Riparian vegetation cover and plantings achieve 80% coverage of area, and or survival of planted stock	>90%	>80%	**Achieved**
Species Presence (December 31, 2021)	Minimum of 9 species of fish are present in the offset measure.	12		**Achieved**
Full Life Cycle Usage (December 31, 2021)	Multiple year classes including young of the year fish are present in the offset feature.	Yes		**Achieved**
Fish Abundance (December 31, 2021)	Overall Catch per Unit Effort (CPUE) for all species combined, for at least two of following capture methods (electrofishing, Minnow Traps, Seine Nets). Minimum success criteria are:			
	Minnow Trap CPUE ≥ 2 fish per trap hour	1.2		On track
	Seine Net CPUE ≥ to 16 fish per 15 m net pull	397		**Achieved**
	Electrofishing CPUE ≥ 44 fish per 1,000 seconds	9.5		On track

Notes:

1. CPUE = catch-per-unit-effort, expressed as the number of fish caught per gear-specific effort type
2. Achieved = planned success criteria already achieved
3. On track = within the expected progress for the performance monitoring period
4. Assess conditions = compensation measure not progressing as expected, further investigation and assess of existing conditions required
5. High proportion of YOY individuals influenced CPUE of gear-specific results since those fish were only catchable using seine netting

9.0 Closing

We trust the information provided in this report meets the performance monitoring obligations with respect to approved Fish Habitat Compensation Plan. Should you require further details or wish to discuss any aspect of this information, please do not hesitate to contact us at your convenience.

Sincerely,

Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Limited

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Reviewed by:

Mark Ruthven, C.E.T.
Head, Environmental Assessment

10.0 References

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New Gold Inc. (New Gold). 2017. West Creek Diversion Commissioning and Termination of Flows in the Natural West Creek Channel. Letter by New Gold Inc., submitted to Fort Francis District Ministry of Natural Resources and Forestry, June 15, 2017.

Appendix A

Physical Function of Offset Measures Photograph Record

Appendix A.1

Water Level Logger Installations

Clark Creek Pond level logger facing east from dam (June 10, 2017)

Clark Creek Pond level logger facing north from dam (June 10, 2017)

Stockpile level logger facing south (June 15, 2017)

Stockpile level logger facing east (July 24, 2018)

Plate A.1-1: Water Level Loggers – Clark Creek and Stockpile Ponds

Level logger sensor and cable/tube, pre-install (April 24, 2018)

West Creek Pond level logger facing northeast (April 24, 2018)

Level logger sensor attached to weight, pre-install (April 24, 2018)

West Creek Pond level logger facing north (April 24, 2018)

Plate A.1-2: Water Level Loggers – West Creek Pond

Appendix A.2

Clark Creek Pond and Diversion Channel

CSS-1 facing upstream during high flow conditions (April 25, 2018)

CSS-1 riffle during high flow conditions (April 25, 2018)

CSS-1 facing west from P3 stake (April 25, 2018)

CSS-1 pool during high flow conditions (April 25, 2018)

Plate A.2-1: Clark Creek Diversion Channel (CSS-1) – High Flow Monitoring

CSS-1 facing upstream during low flow conditions (July 24, 2018)

CSS-1 riffle displaying recent beaver activity (July 24, 2018)

CSS-1 run with heavy vegetation cover (July 24, 2018)

CSS-1 riffle with heavy vegetation cover (July 24, 2018)

Plate A.2-2: Clark Creek Diversion Channel (CSS-1) – Low Flow Monitoring

CSS-2 facing downstream (April 25, 2018)

CSS-2 submerged riffle during high flow conditions (April 25, 2018)

CSS-2 facing downstream (July 24, 2018)

CSS-2 facing west from P4 stake (July 24, 2018)

Plate A.2-3: Clark Creek Diversion Channel (CSS-2) – High and low Flow Monitoring

CSS-3 facing east during high flow conditions (April 25, 2018)

CSS-3 facing east towards P5 (April 25, 2018)

CSS-3 facing south from P5 stake (July 27, 2018)

CSS-3 facing west displaying P5 stake in foreground (July 27, 2018)

Plate A.2-4: Clark Creek Diversion Channel (CSS-3) – High and Low Flow Monitoring

Appendix A.3

Stockpile Pond and Diversion Channel

CSS-6 facing downstream towards culvert (P11) (April 25, 2018)

CSS-6 facing west (downstream) toward culvert (April 25, 2018)

CSS-6 facing east (upstream) (April 25, 2018)

CSS-6 conducting flow monitoring in flat (April 25, 2018)

Plate A.3-1: Stockpile Diversion Channel (CSS-6) – High Flow Monitoring

CSS-6 facing south during low flow conditions (July 24, 2018)

CSS-6 facing upstream through north side culvert (July 24, 2018)

CSS-6 pool downstream of crossing (July 24, 2018)

CSS-6 backwatered pool from West Creek Pond (July 24, 2018)

Plate A.3-2: Stockpile Diversion Channel (CSS-6) – Low Flow Monitoring

CSS-7 facing downstream from confluence (April 24, 2018)

CSS-7 facing upstream toward confluence (April 24, 2018)

CSS-7 facing north, overlooking confluence (April 24, 2018)

CSS-7 conducting flow monitoring in flat (July 27, 2018)

Plate A.3-3: Stockpile Diversion Channel (CSS-7) – High Flow Monitoring

CSS-7 facing upstream toward confluence (July 24, 2018)

CSS-7 facing west toward refuge pool, from confluence (July 24, 2018)

CSS-7 dry riffle in north channel above confluence (July 24, 2018)

CSS-7 stagnant refuge pool below confluence (July 24, 2018)

Plate A.3-4: Stockpile Diversion Channel (CSS-7) – Low Flow Monitoring

CSS-8 facing northwest from Stockpile outlet (April 24, 2018)

CSS-8 facing east toward Stockpile Pond (April 24, 2018)

CSS-8 facing northwest from Stockpile outlet (July 24, 2018)

CSS-8 facing east toward Stockpile Pond (July 24, 2018)

Plate A.3-5: Stockpile Diversion Channel (CSS-8) – High and Low Flow Monitoring

Appendix A.4

West Creek Pond and Diversion Channel

CSS-1 facing upstream (April 24, 2018)

CSS-1 facing downstream to Loslo Creek confluence (April 24, 2018)

CSS-1 conducting flow monitoring in riffle (April 24, 2018)

CSS-1 facing north to confluence with Loslo Creek (April 24, 2018)

Plate A.4-1: West Creek Diversion Channel (CSS-1) – High Flow Monitoring

CSS-1 facing upstream during low flow conditions (July 24, 2018)

CSS-1 facing downstream towards Loslo Cr. confluence (July 24, 2018)

CSS-1 run/riffle during low flow conditions (July 24, 2018)

CSS-1 confluence facing downstream during low flow (July 24, 2018)

Plate A.4-2: West Creek Diversion Channel (CSS-1) – Low Flow Monitoring

CSS-2 facing southwest from P4 (April 26, 2018)

CSS-2 facing west from P4 (April 26, 2018)

CSS-2 facing northeast during low flow conditions (July 24, 2018)

CSS-2 facing southwest during low flow conditions (July 24, 2018)

Plate A.4-3: West Creek Diversion Channel (CSS-2) – High and Low Flow Monitoring

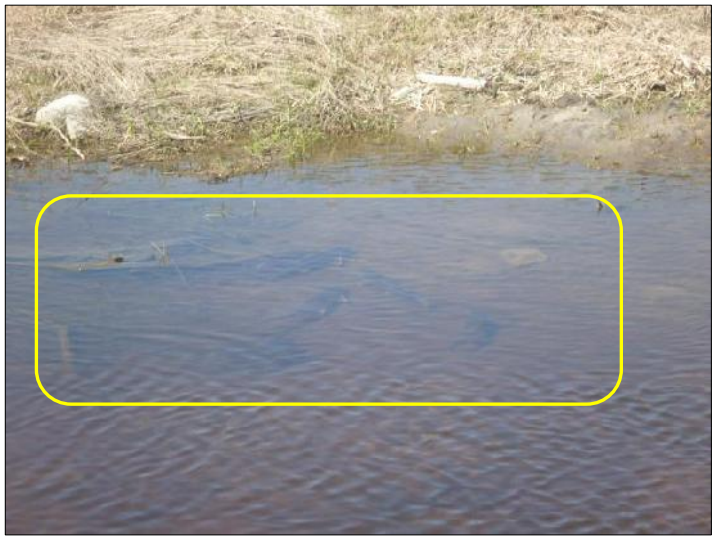
CSS-3 facing upstream toward culvert (C10) (April 26, 2018)

CSS-3 conducting flow monitoring in flat (April 26, 2018)

CSS-3 facing upstream towards culvert (C10) (July 24, 2018)

CSS-3 facing downstream from culvert (C10) (July 24, 2018)

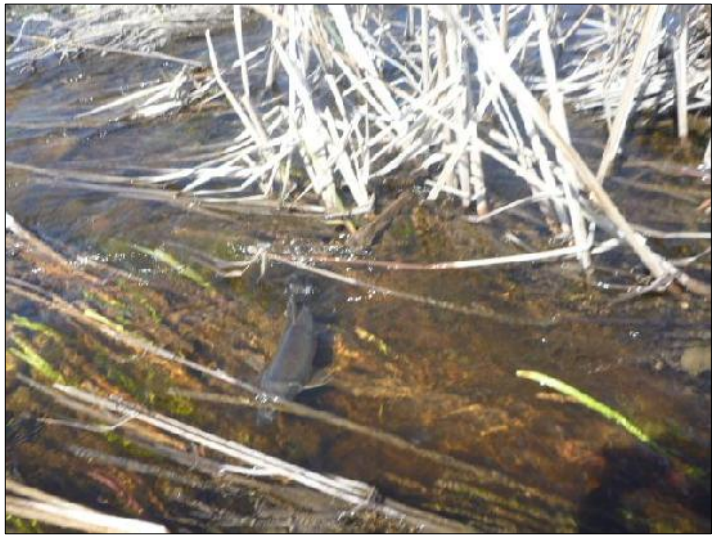
Plate A.4-4: West Creek Diversion Channel (CSS-3) – High and Low Flow Monitoring



White Sucker staging

White Sucker staging

Female White Sucker ripe with eggs



White Sucker swimming through riffle

Plate A.4-5: West Creek Diversion Channel – White Sucker Staging Activity (May 7, 2018)

CSS-4 facing downstream from culvert (P7) (April 24, 2018)

CSS-4 conducting flow monitoring in riffle (April 24, 2018)

CSS-4 facing downstream from P7 (July 24, 2018)

CSS-4 facing downstream from dry riffle (July 24, 2018)

Plate A.4-6: West Creek Diversion Channel (CSS-4) – High and Low Flow Monitoring

CSS-5 facing upstream to West Creek Pond outlet (April 24, 2018)

CSS-5 conducting flow monitoring in riffle at outlet (April 26, 2018)

CSS-5 facing downstream at West Creek Pond outlet (July 24, 2018)

CSS-5 facing downstream from dry run/riffle (July 24, 2018)

Plate A.4-7: West Creek Diversion Channel (CSS-5) – High and Low Flow Monitoring

Appendix B

Stability of Structures Photograph Record

B.1 Clark Creek Pond and Diversion Channel

B.2 Stockpile Pond and Diversion Channel

B.3 West Creek Pond and Diversion Channel

Appendix B.1

Clark Creek Pond and Diversion Channel

Station P1 facing northeast; high flow conditions (April 25, 2018)

Station P1 facing east (April 25, 2018)

Station P1 facing southeast (April 25, 2018)

Station P1 facing northeast (November 28, 2018)

Plate B.1-1: Clark Creek Pond Stability of Structures Photo Station P1

Station P2 southeast; high flow conditions (April 25, 2018)

Station P2 facing southwest to dam (April 25, 2018)

Station P2 facing southeast; low flow conditions (July 27, 2018)

Station P2 facing southwest to dam (July 27, 2018)

Plate B.1-2: Clark Creek Pond Stability of Structures Photo Station P2

Station P3 facing northwest; high flow conditions (April 25, 2018)

Station P3 facing southeast; downstream (April 25, 2018)

Station P3 facing northwest; low flow conditions (July 24, 2018)

Station P3 facing southeast; downstream (July 24, 2018)

Plate B.1-3: Clark Creek Diversion Channel Stability of Structures Photo Station P3

Station P4 facing south; low flow condition (April 25, 2018)

Station P4 facing north; upstream (April 25, 2018)

Station P4 facing south; low flow condition (July 24, 2018)

Station P4 facing north; upstream (July 24, 2018)

Plate B.1-4: Clark Creek Diversion Channel Stability of Structures Photo Station P4

Station P5 facing south; high flow condition (April 25, 2018)

Station P5 facing north; high flow condition (April 25, 2018)

Station P5 facing south, toward Teeple Pond (July 24, 2018)

Station P5 facing north; upstream (July 24, 2018)

Plate B.1-5: Clark Creek Diversion Channel Stability of Structures Photo Station P5

Appendix B.2

Stockpile Pond and Diversion Channel

Station P11 facing west; to West Creek Pond (April 24, 2018)

Station P11 facing east; upstream (April 24, 2018)

Station P11 facing southwest; low flow conditions (July 24, 2018)

Station P11 facing northeast (July 24, 2018)

Plate B.2-1: Stockpile Diversion Channel Stability of Structures Photo Station P11

Station P12 facing west; downstream (April 24, 2018)

Station P12 facing south; toward Stockpile Pond (April 24, 2018)

Station P12 facing northeast; high flow conditions (April 24, 2018)

Station P12 facing northeast; low flow conditions (July 24, 2018)

Plate B.2-2: Stockpile Diversion Channel Stability of Structures Photo Station P12

Station P12 facing west; downstream (July 24, 2018)

Near Station P12 facing south; toward Stockpile Pond (July 24, 2018)

Near Station P12 facing downstream to refuge pool (July 24, 2018)

Near Station P12 facing southeast; downstream (July 24, 2018)

Plate B.2-3: Stockpile Diversion Channel Stability of Structures Photo Station P12

Station P13 facing northeast; high flow conditions (April 24, 2018)

Station P13 facing northwest; downstream (April 24, 2018)

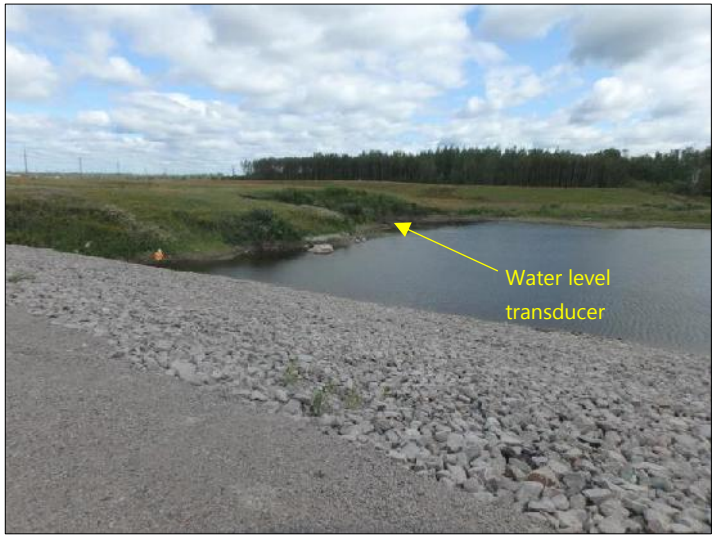
Station P13 facing northeast; low flow conditions (July 24, 2018)

Station P13 facing northwest; downstream (July 24, 2018)

Plate B.2-4: Stockpile Diversion Channel Stability of Structures Photo Station P13

Station P14 facing northeast; high flow conditions (April 24, 2018)

Station P14 facing east; high flow conditions (April 24, 2018)



Station P14 facing northeast, low flow conditions (July 24, 2018)

Station P14 facing east; low flow conditions (July 24, 2018)

Plate B.2-5: Stockpile Pond Stability of Structures Photo Station P14

Station P14 facing east; high flow conditions (April 24, 2018)

Station P14 facing east; pond frozen (November 28, 2018)

Plate B.2-6: Stockpile Pond Stability of Structures Photo Station P14

Appendix B.3

West Creek Pond and Diversion Channel

Station P1 facing northeast; high flow conditions (April 24, 2018)

Station P1 facing north (April 24, 2018)

Station P1 facing south (April 24, 2018)

Station P1 facing northeast; to confluence (July 24, 2018)

Plate B.3-1: West Creek Diversion Channel Stability of Structures Photo Station P1

Station P1 south; low flow conditions (July 24, 2018)

Station P1 facing north (July 24, 2018)

Station P2 facing southeast; high flow conditions (April 24, 2018)

Station P2 facing southeast; low flow conditions (July 24, 2018)

Plate B.3-2: West Creek Diversion Channel Stability of Structures Photo Stations P1 and P2

Station P3 facing southwest; high flow conditions (April 24, 2018)

Station P3 facing northeast; upstream (April 24, 2018)

Station P3 facing southwest; low flow conditions (July 24, 2018)

Station P3, facing northeast; upstream (July 24, 2018)

Plate B.3-3: West Creek Diversion Channel Stability of Structures Photo Station P3

Station P4 facing southwest; high flow conditions (April 26, 2018)

Station P4 facing northeast; upstream (April 26, 2018)

Station P4 facing southwest; low flow conditions (July 24, 2018)

Station P4 facing northeast; upstream (July 24, 2018)

Plate B.3-4: West Creek Diversion Channel Stability of Structures Photo Station P4

Station P5 facing northeast; high flow conditions (April 26, 2018)


Station P5 facing south; high flow conditions (April 26, 2018)

Station P5 facing northeast (July 24, 2018)


P5 facing southwest; downstream (July 29, 2018)

Plate B.3-5: West Creek Diversion Channel Stability of Structures Photo Station P5

Station P6 facing northeast; high flow conditions (April 26, 2018)

Station P6 facing southwest; high flow conditions (April 26, 2018)

Station P6 facing northeast; low flow conditions (July 24, 2018)

Station P6 facing southwest; downstream (July 24, 2018)

Plate B.3-6: West Creek Diversion Channel Stability of Structures Photo Station P6

Station P7 facing northwest; high flow conditions (April 26, 2018)

Station P7 facing southeast; upstream (April 26, 2018)

Station P7 facing northwest (July 24, 2018)

Station P7 facing southeast; upstream (July 24, 2018)

Plate B.3-7: West Creek Diversion Channel Stability of Structures Photo Station P7

Station P8 facing northwest; high flow conditions (April 24, 2018)

Station P8 facing south; high flow conditions (April 24, 2018)

Station P8 facing northwest (July 24, 2018)

Station P8 facing south (July 24, 2018)

Plate B.3-8: West Creek Diversion Channel Stability of Structures Photo Station P8

Station P8 facing southeast; high flow conditions (April 24, 2018)

Station P8 facing southeast; high flow conditions (April 24, 2018)

Station P8 facing southeast; low flow conditions (July 24, 2018)

Station P8 facing southeast; low flow conditions (July 24, 2018)

Plate B.3-9: West Creek Diversion Channel Stability of Structures Photo Station P8

Station P9 facing northeast (April 24, 2018)

Station P9 facing northeast; high flow condition (April 26, 2018)


Station P9 facing northeast; low flow conditions (July 24, 2018)


Station P9 facing northeast (July 24, 2018)

Plate B.3-10: West Creek Pond Stability of Structures Photo Station P9

Station P10 facing west; high flow conditions (April 24, 2018)

Station P10 facing northwest (April 24, 2018)

Station P10 facing west; low flow conditions (July 24, 2018)

Station P10 facing northwest (July 24, 2018)

Plate B.3-11: West Creek Pond Stability of Structures Photo Station P10

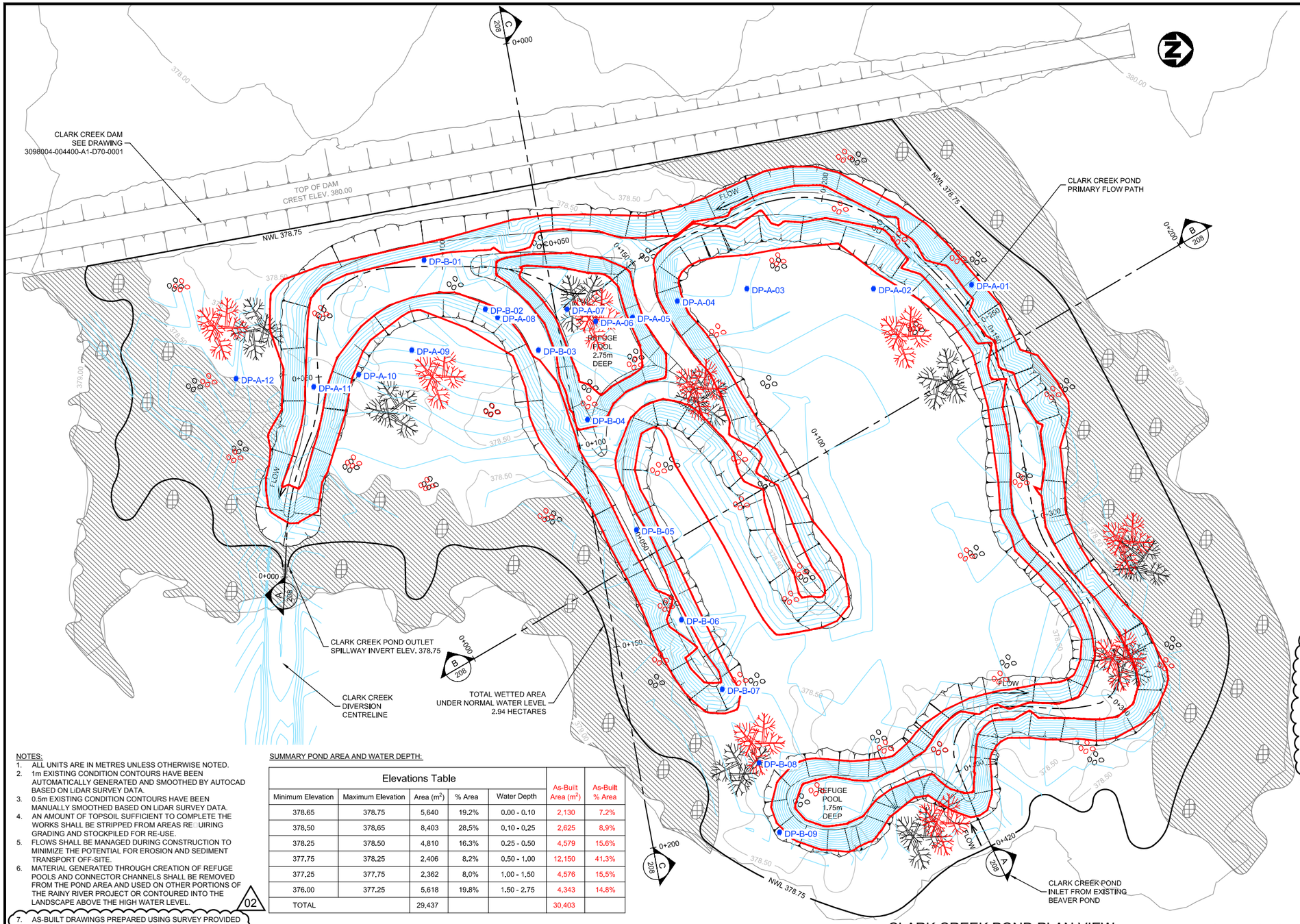
Station P10 facing southeast; high flow conditions (April 24, 2018)

Station P10 facing southeast (July 24, 2018)

Plate B.3-12: West Creek Pond Stability of Structures Photo Station P10

Appendix C

Attachments



LEGEND

BOULDER CLUSTER

TREE PILE

ZONE A - SCRUB-SHRUB WETLAND - 350 m^2

ZONE B - EMERGENT WETLAND - 12,254 m^2

NWL NORMAL WATER LEVEL

VEGETATION RESTORATION NOTES:

1. ALL AREAS EXCAVATED TO THE DEPTH OF MINERAL SOIL SHALL BE TREATED WITH A MINIMUM OF 100mm OF TOPSOIL / ORGANIC SOIL SALVAGED FROM SITE.
2. PLACED TOPSOIL SHALL BE COMPACTED UTILIZING THE TRACK WEIGHT OF A CRAWLER TRACTOR OR DOZER. FURTHER MACHINERY TRAFFIC ATOP PLACED TOPSOIL SHALL BE MINIMIZED TO PREVENT OVER-COMPACTION.
3. ANY SOIL COMPACTED DUE TO REPEATED MACHINERY ACCESS SHALL BE LOOSENED PRIOR TO SEED APPLICATION.
4. ALL DISTURBED SOILS SHALL BE STABILIZED WITH A NURSE CROP OUTLINED IN TABLE 2.
5. ZONE A AND B SHALL BE SEEDED WITH NATIVE WETLAND SEED MIX AT A RATE OF 5.5 kg/ha IN ADDITION TO NURSE CROP SEED.
6. ZONE A SHALL BE PLANTED WITH NATIVE SHRUB CUTTINGS. CUTTINGS SHALL BE PLANTED AT A 0.75m SPACING. ZONE A PLANTING AREAS SHALL BE APPROXIMATELY 10 m^2 IN SIZE AND LOCATED AS SHOWN IN THE PLAN VIEW DRAWING.
7. NATIVE SHRUB CUTTINGS SHALL BE TAKEN FROM WILLOW AND DOGWOOD SPECIES PRESENT ON SITE AND IN SURROUNDING AREA.
8. NATIVE SHRUB CUTTINGS SHALL BE HARVESTED DURING THE PLANTS' DORMANT PERIOD AND SHALL BE TREATED WITH ROOTING HORMONE PRIOR TO PLANTING.
9. NO PLANTING OR SEEDING IS REQUIRED WITHIN EXISTING BEAVER PONDS OR CONNECTING CHANNELS.
10. SUBSTITUTIONS OF PLANT MATERIAL MUST BE APPROVED BY NEW GOLD'S ENVIRONMENTAL SPECIALIST.

TABLE 1. MATERIAL SUMMARY

ZONE	MATERIAL	QUANTITY
DISTURBED AREAS	NURSE CROP SEED MIX	VARIES
A & B	WETLAND SEED MIX	6.9 kg
A	NATIVE SHRUB CUTTINGS	622
-	BOULDER CLUSTER	34
-	TREE PILE	9

CUTTINGS SHALL BE COMPRISED OF VARIOUS NATIVE WILLOW AND DOGWOOD SPECIES PRESENT ONSITE AND IN THE SURROUNDING AREA.

TABLE 2. NURSE CROP SEEDING

TIMING OF SEEDING	SELECTED SEED TYPE		
	LATIN NAME	COMMON NAME	APPLICATION RATE
POST-SPRING FRESHET TO AUG. 14	*Avena sativa*	Oats	30 kg/ha
AUG. 15 TO OCT. 15	*Triticum aestivum*	Winter Wheat	30 kg/ha

02

TABLE 3. WETLAND SEED MIX (APPLICATION RATE 5.5 kg/ha)

SPECIES	COMMON NAME	PERCENTAGE OF MIX (BY WEIGHT)
GRASSES (TOTAL 50% OF MIX)		
Glyceria grandis	Tall Manna Grass	14 %
Elymus virginicus	Virginia Wild Rye	27 %
Leersia oryzoides	Rice Cut Grass	9 %
SEDGES AND RUSHES (TOTAL 31% OF MIX)		
Carex comosa	Bristly Sedge	8 %
Carex lacustris	Lake Sedge	2 %
Carex stricta	Tussock Sedge	3 %
Juncus canadensis	Canadian Rush	6 %
Scirpus validus	Soft Stem Bulrush	8 %
Scirpus cyperinus	Woolgrass	4 %
FORBS (TOTAL 19% OF MIX)		
Acorus americanus	Sweet Flag	4 %
Alisma subcordatum	Water Plantain	4 %
Sagittaria latifolia	Broad-Leaved Arrowhead	3 %
Sparganium eurycarpum	Giant Bur Reed	8 %

NOTES:

1. ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED.
2. 1m EXISTING CONDITION CONTOURS HAVE BEEN AUTOMATICALLY GENERATED AND SMOOTHED BY AUTOCAD BASED ON LiDAR SURVEY DATA.
3. 0.5m EXISTING CONDITION CONTOURS HAVE BEEN MANUALLY SMOOTHED BASED ON LiDAR SURVEY DATA.
4. AN AMOUNT OF TOPSOIL SUFFICIENT TO COMPLETE THE WORKS SHALL BE STRIPPED FROM AREAS REQUIRING GRADING AND STOCKPILED FOR RE-USE.
5. FLOWS SHALL BE MANAGED DURING CONSTRUCTION TO MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENT TRANSPORT OFF-SITE.
6. MATERIAL GENERATED THROUGH CREATION OF REFUGE POOLS AND CONNECTOR CHANNELS SHALL BE REMOVED FROM THE POND AREA AND USED ON OTHER PORTIONS OF THE RAINY RIVER PROJECT OR CONTOURED INTO THE LANDSCAPE ABOVE THE HIGH WATER LEVEL.
7. AS-BUILT DRAWINGS PREPARED USING SURVEY PROVIDED BY NEW GOLD NOVEMBER 11 2016.

02

SUMMARY POND AREA AND WATER DEPTH:

Elevations Table						
Minimum Elevation	Maximum Elevation	Area (m^2)	% Area	Water Depth	As-Built Area (m^2)	As-Built % Area
378.65	378.75	5,640	19.2%	0.00 - 0.10	2,130	7.2%
378,50	378,65	8,403	28.5%	0.10 - 0.25	2,625	8,9%
378.25	378.50	4,810	16.3%	0.25 - 0.50	4,579	15,6%
377.75	378.25	2,406	8.2%	0.50 - 1.00	12,150	41,3%
377.25	377,75	2,362	8,0%	1.00 - 1.50	4,576	15,5%
376.00	377.25	5,618	19.8%	1.50 - 2.75	4,343	14,8%
TOTAL		29,437			30,403	

CLARK CREEK POND PLAN VIEW

SCALE : 1:500

0m 5 10 15 20

1 : 500

3098004-004400-A1-D50-0002

REFERENCE DRAWINGS:

THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NO. 3098004-004400-A1-D50-0001, 3098004-004400-A1-D50-0003, 3098004-004400-A1-D70-0001, AND 3098004-004400-A1-D70-0002.

03	20	12	2017	AS-BUILT - BOULDER CLUSTERS UPDATED	NSH	MCR
02	07	12	2016	AS-BUILT	NSH	DGR
01	14	11	2014	ISSUED FOR TENDER	NSH	DGR
00	15	09	2014	ISSUED FOR USE	NSH	DGR
AC	15	08	2014	ISSUED FOR CLIENT APPROVAL	NSH	MCR
AB	16	07	2014	ISSUED FOR CLIENT APPROVAL	NSH	MCR
AA	30	12	2013	ISSUED FOR REVIEW	NSH	MCR
REV	D	M	Y	ISSUE/REVISION DESCRIPTION	DES.	APPR

newgold Rainy River Project

amec.com/earthandenvironmental

Client: NEW GOLD INC.

AMEC Environment & Infrastructure
160 Traders Boulevard East
Mississauga, Ontario, Canada L4Z 3K7

DRAWN BY:	NSH
DESIGNED BY:	NSH
CHECKED BY:	MCR
REVIEWED BY:	DGR
APPROVED BY:	DGR

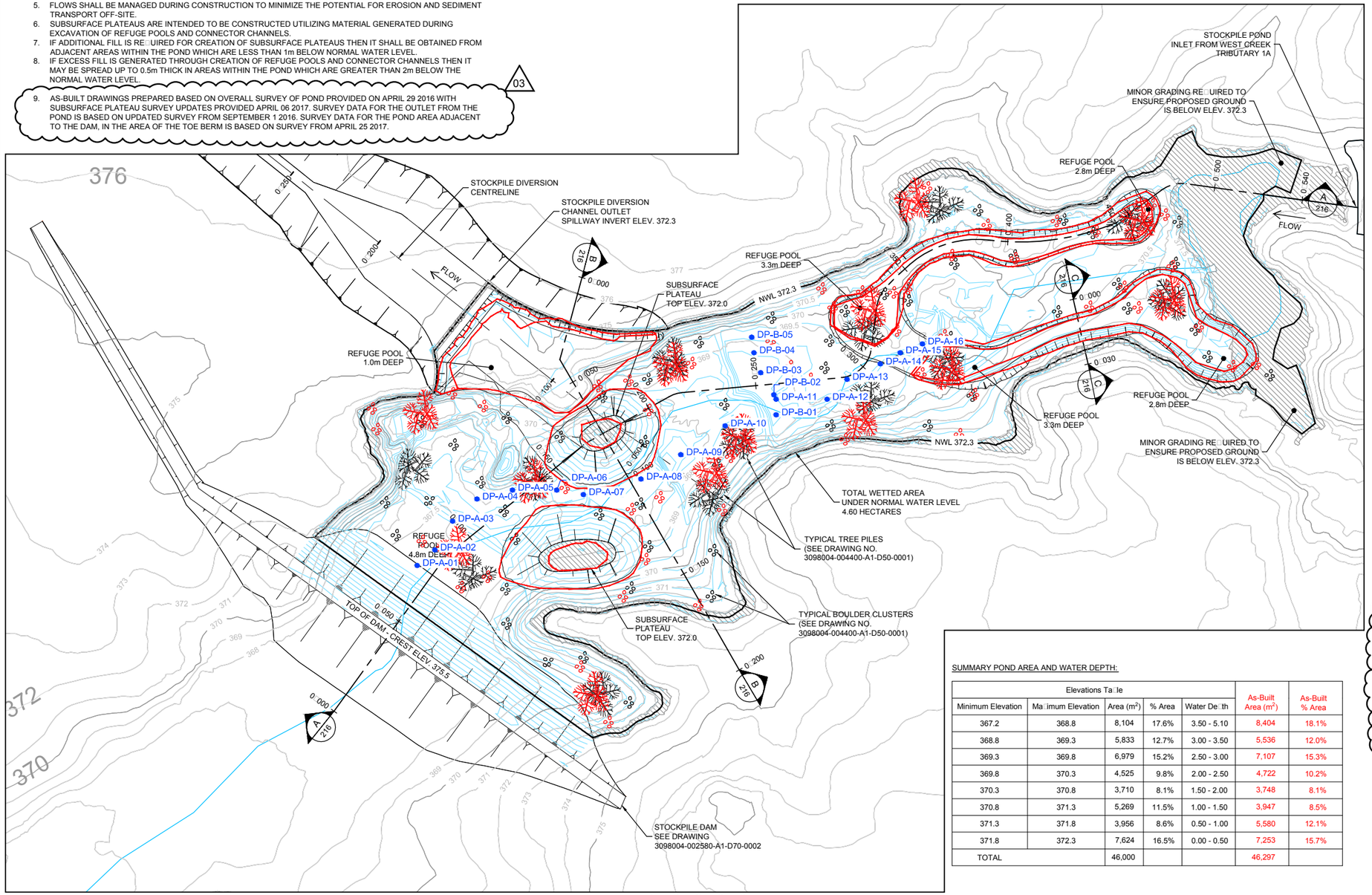
PROJECT: RAINY RIVER PROJECT
DETAILED DESIGN

TITLE: CLARK CREEK POND
PLAN VIEW

PROJECT NO.:	TC133921
REVISION NO.	03
DATE:	DEC. 2013
SCALE:	AS SHOWN
DRAWING NO.:	207

NOTES:
1. ALL UNITS ARE IN METERS UNLESS OTHERWISE NOTED.
2. 1m EXISTING CONDITION CONTOURS HAVE BEEN AUTOMATICALLY GENERATED AND SMOOTHED BY AUTOCAD BASED ON LiDAR SURVEY DATA.
3. 0.5m EXISTING CONDITION CONTOURS HAVE BEEN MANUALLY SMOOTHED BASED ON LiDAR SURVEY DATA.
4. AN AMOUNT OF TOPSOIL SUFFICIENT TO COMPLETE THE WORKS SHALL BE STRIPPED FROM AREAS RE□UIRING GRADING AND STOCKPILED FOR RE-USE.
5. FLOWS SHALL BE MANAGED DURING CONSTRUCTION TO MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENT TRANSPORT OFF-SITE.
6. SUBSURFACE PLATEAUS ARE INTENDED TO BE CONSTRUCTED UTILIZING MATERIAL GENERATED DURING EXCAVATION OF REFUGE POOLS AND CONNECTOR CHANNELS.
7. IF ADDITIONAL FILL IS RE□UIRED FOR CREATION OF SUBSURFACE PLATEAUS THEN IT SHALL BE OBTAINED FROM ADJACENT AREAS WITHIN THE POND WHICH ARE LESS THAN 1m BELOW NORMAL WATER LEVEL.
8. IF EXCESS FILL IS GENERATED THROUGH CREATION OF REFUGE POOLS AND CONNECTOR CHANNELS THEN IT MAY BE SPREAD UP TO 0.5m THICK IN AREAS WITHIN THE POND WHICH ARE GREATER THAN 2m BELOW THE NORMAL WATER LEVEL.
9. AS-BUILT DRAWINGS PREPARED BASED ON OVERALL SURVEY OF POND PROVIDED ON APRIL 29 2016 WITH SUBSURFACE PLATEAU SURVEY UPDATES PROVIDED APRIL 06 2017. SURVEY DATA FOR THE OUTLET FROM THE POND IS BASED ON UPDATED SURVEY FROM SEPTEMBER 1 2016. SURVEY DATA FOR THE POND AREA ADJACENT TO THE DAM, IN THE AREA OF THE TOE BERM IS BASED ON SURVEY FROM APRIL 25 2017.

03



STOCKPILE POND PLAN VIEW
SCALE : 1:1000

0m 10 20 30 40
1 : 1000

LEGEND

	BOULDER CLUSTER (51)		ZONE A - SCRUB-SHRUB WETLAND - 1,249 m^2
	TREE PILE (13)		ZONE B - EMERGENT WETLAND - 8,007 m^2
NWL	NORMAL WATER LEVEL		

VEGETATION RESTORATION NOTES:

1. ALL AREAS EXCAVATED TO THE DEPTH OF MINERAL SOIL SHALL BE TREATED WITH A MINIMUM OF 100mm OF TOPSOIL / ORGANIC SOIL SALVAGED FROM SITE.
2. PLACED TOPSOIL SHALL BE COMPACTED UTILIZING THE TRACK WEIGHT OF A CRAWLER TRACTOR OR DOZER. FURTHER MACHINERY TRAFFIC ATOP PLACED TOPSOIL SHALL BE MINIMIZED TO PREVENT OVER-COMPACTION.
3. ANY SOIL COMPACTED DUE TO REPEATED MACHINERY ACCESS SHALL BE LOOSENED PRIOR TO SEED APPLICATION.
4. ALL DISTURBED SOILS SHALL BE STABILIZED WITH A NURSE CROP OUTLINED IN TABLE 2.
5. ZONE A AND B SHALL BE SEEDED WITH NATIVE WETLAND SEED MIX AT A RATE OF 5.5 kg/ha IN ADDITION TO NURSE CROP SEED.
6. ZONE A SHALL BE PLANTED WITH NATIVE SHRUB CUTTINGS. CUTTINGS SHALL BE PLANTED IN CLUMPS OF 3 - 12 AT A 0.75m SPACING. A TOTAL OF 15-25% OF ZONE A SHALL BE PLANTED WITH THESE CUTTINGS.
7. NATIVE SHRUB CUTTINGS SHALL BE TAKEN FROM WILLOW AND DOGWOOD SPECIES PRESENT ON SITE AND IN SURROUNDING AREA.
8. NATIVE SHRUB CUTTINGS SHALL BE HARVESTED DURING THE PLANT'S DORMANT PERIOD AND SHALL BE TREATED WITH ROOTING HORMONE PRIOR TO PLANTING.
9. NO PLANTING OR SEEDING IS RE□UIRED WITHIN EXISTING BEAVER PONDS OR CONNECTING CHANNELS.
10. SUBSTITUTIONS OF PLANT MATERIAL MUST BE APPROVED BY NEW GOLD'S ENVIRONMENTAL SPECIALIST.

TABLE 1. MATERIAL SUMMARY

ZONE	MATERIAL	□UANTITY
DISTURBED AREAS	NURSE CROP SEED MIX	VARIES
A & B	WETLAND SEED MIX	5.1 □g
A	NATIVE SHRUB CUTTINGS□	445
-	BOULDER CLUSTER	51
-	TREE PILE	13

□CUTTINGS SHALL BE COMPRISED OF VARIOUS NATIVE WILLOW AND DOGWOOD SPECIES PRESENT ONSITE AND IN THE SURROUNDING AREA.

TABLE 2. NURSE CROP SEEDING

TIMING OF SEEDING	SELECTED SEED TYPE		
	LATIN NAME	COMMON NAME	APPLICATION RATE
POST-SPRING FRESHET TO AUG. 14	*Avena sativa*	Oats	30 □g/ha
AUG. 15 TO OCT. 15	*Triticum aestivum*	Winter Wheat	30 □g/ha

03

TABLE 3. WETLAND SEED MIX (APPLICATION RATE 5.5 □g/ha)

SPECIES	COMMON NAME	PERCENTAGE OF MIX (BY WEIGHT)
GRASSES (TOTAL 50% OF MIX)		
Glyceria grandis	Tall Manna Grass	14 %
Elymus virginicus	Virginia Wild Rye	27 %
Leersia oryzoides	Rice Cut Grass	9 %
SEDGES AND RUSHES (TOTAL 31% OF MIX)		
Carex comosa	Bristly Sedge	8 %
Carex lacustris	La□e Sedge	2 %
Carex stricta	Tussoc□ Sedge	3 %
Juncus canadensis	Canadian Rush	6 %
Scirpus validus	Soft Stem Bulrush	8 %
Scirpus cyperinus	Woolgrass	4 %
FORBS (TOTAL 19% OF MIX)		
Acorus americanus	S□eet Flag	4 %
Alisma subcordatum	Water Plantain	4 %
Sagittaria latifolia	Broad-Leaved Arro□head	3 %
Sparganium eurycarpum	Giant Bur Reed	8 %

SUMMARY POND AREA AND WATER DEPTH:

Elevations Ta□le					As-Built Area (m^2)	As-Built % Area
Minimum Elevation	Ma□imum Elevation	Area (m^2)	% Area	Water De□th		
367.2	368.8	8,104	17.6%	3.50 - 5.10	8,404	18.1%
368.8	369.3	5,833	12.7%	3.00 - 3.50	5,536	12.0%
369.3	369.8	6,979	15.2%	2.50 - 3.00	7,107	15.3%
369.8	370.3	4,525	9.8%	2.00 - 2.50	4,722	10.2%
370.3	370.8	3,710	8.1%	1.50 - 2.00	3,748	8.1%
370.8	371.3	5,269	11.5%	1.00 - 1.50	3,947	8.5%
371.3	371.8	3,956	8.6%	0.50 - 1.00	5,580	12.1%
371.8	372.3	7,624	16.5%	0.00 - 0.50	7,253	15.7%
TOTAL		46,000			46,297	

3098004-002580-A1-D50-0001

REFERENCED DRAWINGS:

THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NO. 3098004-004400-A1-D50-0001, 3098004-002580-A1-D50-0002, 3098004-002580-A1-D70-0002, AND 3098004-002580-A1-D70-0004.

03	04	12	2017	AS-BUILT	NSH	
02	15	04	2015	ISSUED FOR CONSTRUCTION	NSH	DGR
01	14	11	2014	ISSUED FOR TENDER (REVISED LOCATION)	NSH	DGR
00	15	09	2014	ISSUED FOR USE	NSH	DGR
AB	15	08	2014	ISSUED FOR CLIENT APPROVAL	NSH	MCR
AB	16	07	2014	ISSUED FOR CLIENT APPROVAL	NSH	MCR
AA	19	12	2013	ISSUED FOR REVIEW	NSH	MCR
REV	D	M	Y	ISSUE/REVISION DESCRIPTION	DES.	APPR

newgold Rainy River Project

Client:
NEW GOLD INC.

AMEC Environment & Infrastructure
160 Traders Boulevard East
Mississauga, Ontario, Canada L4Z 3K7
□□□.amec.com/earthandenvironmental

DRAWN BY: NSH
DESIGNED BY: NSH
CHECKED BY: MCR
REVIEWED BY: DGR
APPROVED BY: DGR

PROJECT: RAINY RIVER PROJECT DETAILED DESIGN

TITLE: STOCKPILE POND PLAN VIEW

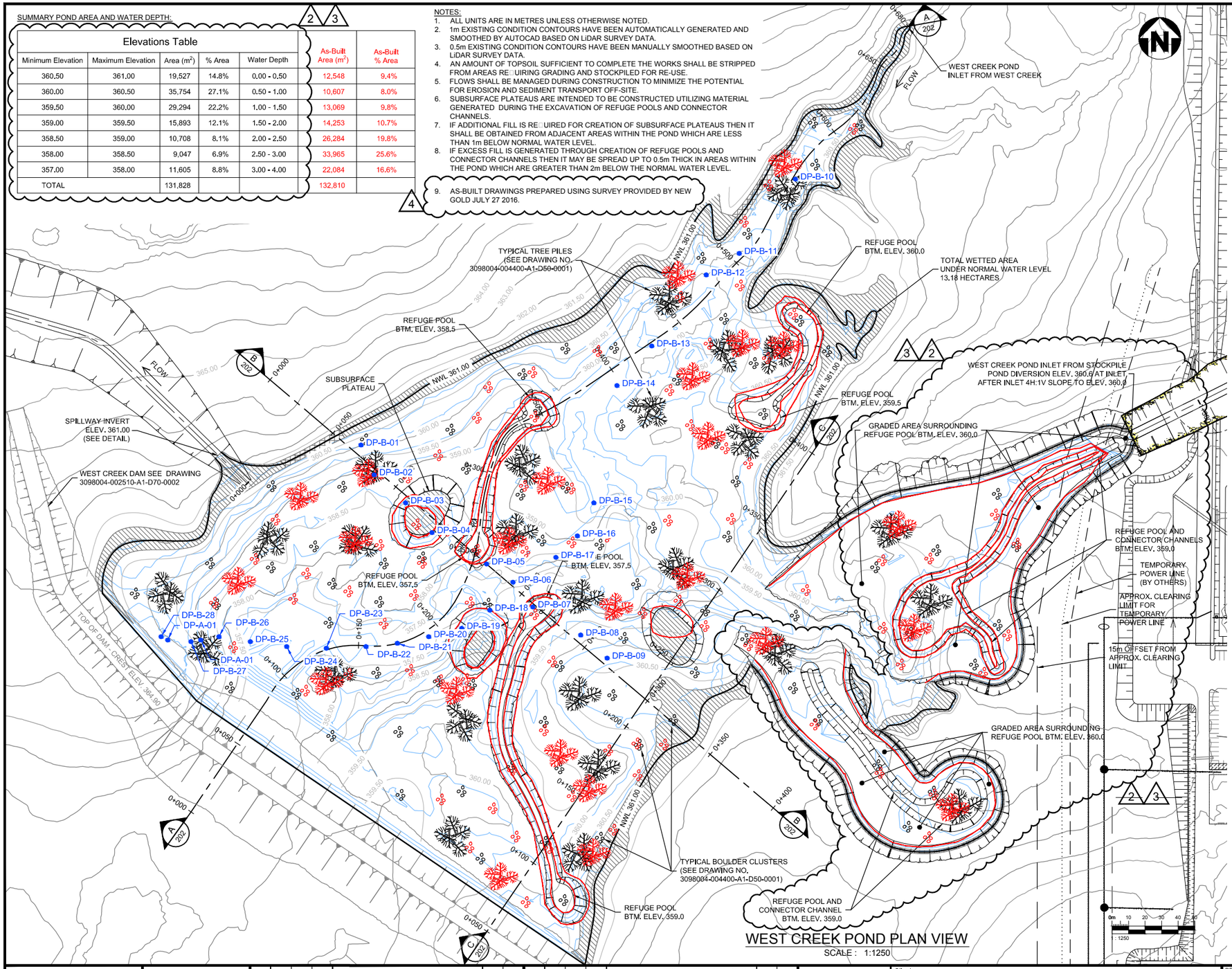
PROJECT NO.: TC133921
REVISION NO. 03
DATE: DEC. 2013
SCALE: AS SHOWN
DRAWING NO.: 215

I:\Working Folders - 2014\-00-11\RR\Schedule 2\As Built\Stockpile\Pond\3P - Pond - As-Built_Depth Locations.dwg - Plan - Dec. 14, 2015, 3:35pm - matthew.hastings

SUMMARY POND AREA AND WATER DEPTH:

Elevations Table					As-Built	As-Built
Minimum Elevation	Maximum Elevation	Area (m^2)	% Area	Water Depth	Area (m^2)	% Area
360.50	361.00	19,527	14.8%	0.00 - 0.50	12,548	9.4%
360.00	360.50	35,754	27.1%	0.50 - 1.00	10,607	8.0%
359.50	360.00	29,294	22.2%	1.00 - 1.50	13,069	9.8%
359.00	359.50	15,893	12.1%	1.50 - 2.00	14,253	10.7%
358.50	359.00	10,708	8.1%	2.00 - 2.50	26,284	19.8%
358.00	358.50	9,047	6.9%	2.50 - 3.00	33,965	25.6%
357.00	358.00	11,605	8.8%	3.00 - 4.00	22,084	16.6%
TOTAL		131,828			132,810	

NOTES:
1. ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED.
2. 1m EXISTING CONDITION CONTOURS HAVE BEEN AUTOMATICALLY GENERATED AND SMOOTHED BY AUTOCAD BASED ON LiDAR SURVEY DATA.
3. 0.5m EXISTING CONDITION CONTOURS HAVE BEEN MANUALLY SMOOTHED BASED ON LiDAR SURVEY DATA.
4. AN AMOUNT OF TOPSOIL SUFFICIENT TO COMPLETE THE WORKS SHALL BE STRIPPED FROM AREAS RE□UIRING GRADING AND STOCKPILED FOR RE-USE.
5. FLOWS SHALL BE MANAGED DURING CONSTRUCTION TO MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENT TRANSPORT OFF-SITE.
6. SUBSURFACE PLATEAUS ARE INTENDED TO BE CONSTRUCTED UTILIZING MATERIAL GENERATED DURING THE EXCAVATION OF REFUGE POOLS AND CONNECTOR CHANNELS.
7. IF ADDITIONAL FILL IS RE□UIRED FOR CREATION OF SUBSURFACE PLATEAUS THEN IT SHALL BE OBTAINED FROM ADJACENT AREAS WITHIN THE POND WHICH ARE LESS THAN 1m BELOW NORMAL WATER LEVEL.
8. IF EXCESS FILL IS GENERATED THROUGH CREATION OF REFUGE POOLS AND CONNECTOR CHANNELS THEN IT MAY BE SPREAD UP TO 0.5m THICK IN AREAS WITHIN THE POND WHICH ARE GREATER THAN 2m BELOW THE NORMAL WATER LEVEL.
9. AS-BUILT DRAWINGS PREPARED USING SURVEY PROVIDED BY NEW GOLD JULY 27 2016.



WEST CREEK POND PLAN VIEW
SCALE : 1:1250

LEGEND

	BOULDER CLUSTER	ZONE A - SCRUB-SHRUB WETLAND	12,247 m^2
	TREE PILE	ZONE B - EMERGENT WETLAND	16,440 m^2
NWL	NORMAL WATER LEVEL		

VEGETATION RESTORATION NOTES:

1. ALL AREAS EXCAVATED TO THE DEPTH OF MINERAL SOIL SHALL BE TREATED WITH A MINIMUM OF 100mm OF TOPSOIL / ORGANIC SOIL SALVAGED FROM SITE.
2. PLACED TOPSOIL SHALL BE COMPACTED UTILIZING THE TRACK WEIGHT OF A CRAWLER TRACTOR OR DOZER. FURTHER MACHINERY TRAFFIC ATOP PLACED TOPSOIL SHALL BE MINIMIZED TO PREVENT OVER-COMPACTION.
3. ANY SOIL COMPACTED DUE TO REPEATED MACHINERY ACCESS SHALL BE LOOSENED PRIOR TO SEED APPLICATION.
4. ALL DISTURBED SOILS SHALL BE STABILIZED WITH A NURSE CROP OUTLINED IN TABLE 2.
5. ZONE A AND B SHALL BE SEEDED WITH NATIVE WETLAND SEED MIX AT A RATE OF 5.5 kg/ha IN ADDITION TO NURSE CROP SEED.
6. ZONE A SHALL BE PLANTED WITH NATIVE SHRUB CUTTINGS. CUTTINGS SHALL BE PLANTED IN CLUMPS OF 3 - 12 AT A 0.75m SPACING. A TOTAL OF 15-25% OF ZONE A SHALL BE PLANTED WITH THESE CUTTINGS .
7. NATIVE SHRUB CUTTINGS SHALL BE TAKEN FROM WILLOW AND DOGWOOD SPECIES PRESENT ON SITE AND IN SURROUNDING AREA.
8. NATIVE SHRUB CUTTINGS SHALL BE HARVESTED DURING THE PLANTS' DORMANT PERIOD AND SHALL BE TREATED WITH ROOTING HORMONE PRIOR TO PLANTING.
9. NO PLANTING OR SEEDING IS RE□UIRED WITHIN AREAS WHICH ARE EXISTING BEAVER PONDS OR CONNECTING CHANNELS.
10. SUBSTITUTIONS OF PLANT MATERIAL MUST BE APPROVED BY NEW GOLD'S ENVIRONMENTAL SPECIALIST.

TABLE 1. MATERIAL SUMMARY

ZONE	MATERIAL	□UANTITY
DISTURBED AREAS	NURSE CROP SEED MIX	VARIES
A & B	WETLAND SEED MIX	10.3 □g
A	NATIVE SHRUB CUTTINGS□	799
-	BOULDER CLUSTER	80
-	TREE PILE	25

□CUTTINGS SHALL BE COMPRISED OF VARIOUS NATIVE WILLOW AND DOGWOOD SPECIES PRESENT ONSITE AND IN THE SURROUNDING AREA.

TABLE 2. NURSE CROP SEEDING

TIMING OF SEEDING	SELECTED SEED TYPE		
	LATIN NAME	COMMON NAME	APPLICATION RATE
POST-SPRING FRESHET TO AUG. 14	*Avena sativa*	Oats	30 □g/ha
AUG. 15 TO OCT. 15	*Triticum aestivum*	Winter Wheat	30 □g/ha

4 — 24 TREE PILES INSTALLED ACCORDING TO AS-BUILT SURVEY

4 — 79 BOULDER CLUSTERS INSTALLED ACCORDING TO AS-BUILT SURVEY

TABLE 3. WETLAND SEED MIX (APPLICATION RATE 5.5 □g/ha)

SPECIES	COMMON NAME	PERCENTAGE OF MIX (BY WEIGHT)
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3098004-002510-A1-D50-0002

REFERENCE DRAWINGS:

THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NO. 3098004-004400-A1-D50-0001, 3098004-002510-A1-D50-0003, 3098004-002510-A1-D70-0002, AND 3098004-002510-A1-D70-0003.

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	DES.	APPR.
04	06	12	2017	AS-BUILT	NSH	MCR
AA	20	12	2013	ISSUED FOR REVIEW	NSH	MCR
AB	15	07	2014	ISSUED FOR CLIENT APPROVAL	NSH	MCR
AC	15	08	2014	ISSUED FOR CLIENT APPROVAL	NSH	MCR
00	15	09	2014	ISSUED FOR USE	NSH	DGR
01	14	11	2014	ISSUED FOR TENDER	NSH	DGR
02	12	08	2015	ISSUED FOR CONSTRUCTION (REVISED EASTERN GRADING)	NSH	DGR
03	08	09	2015	ISSUED FOR CONSTRUCTION (REVISED EASTERN GRADING)	NSH	DGR

newgold Rainy River Project

Client: NEW GOLD INC.

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DRAWN BY:	NSH
DESIGNED BY:	NSH
CHECKED BY:	MCR
REVIEWED BY:	DGR
APPROVED BY:	DGR

PROJECT:	RAINY RIVER PROJECT DETAILED DESIGN
TITLE:	WEST CREEK POND PLAN VIEW
PROJECT NO.:	TC133921
REVISION NO.	04
DATE:	DEC. 2013
SCALE:	AS SHOWN
DRAWING NO.:	201

Limitations

Limitations

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:
    a. The Standard Terms and Conditions which form a part of our Professional Services Contract;
    b. The Scope of Services;
    c. Time and Budgetary limitations as described in our Contract; and
    d. The Limitations stated herein.
2. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.
3. The conclusions presented in this report were based, in part, on visual observations of the Site and attendant structures. Our conclusions cannot and are not extended to include those portions of the Site or structures, which are not reasonably available, in Wood's opinion, for direct observation.
4. The environmental conditions at the Site were assessed, within the limitations set out above, having due regard for applicable environmental regulations as of the date of the inspection. A review of compliance by past owners or occupants of the Site with any applicable local, provincial or federal bylaws, orders-in-council, legislative enactments and regulations was not performed.
5. The Site history research included obtaining information from third parties and employees or agents of the owner. No attempt has been made to verify the accuracy of any information provided, unless specifically noted in our report.
6. Where testing was performed, it was carried out in accordance with the terms of our contract providing for testing. Other substances, or different quantities of substances testing for, may be present on-site and may be revealed by different or other testing not provided for in our contract.
7. Because of the limitations referred to above, different environmental conditions from those stated in our report may exist. Should such different conditions be encountered, Wood must be notified in order that it may determine if modifications to the conclusions in the report are necessary.
8. The utilization of Wood's services during the implementation of any remedial measures will allow Wood to observe compliance with the conclusions and recommendations contained in the report. Wood's involvement will also allow for changes to be made as necessary to suit field conditions as they are encountered.
9. This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or the part, or any reliance thereon or decisions made based on any information or conclusions in the report is the sole responsibility of such third party. Wood accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.
10. This report is not to be given over to any third party for any purpose whatsoever without the written permission of Wood.
11. Provided that the report is still reliable, and less than 12 months old, Wood will issue a third-party reliance letter to parties that the client identifies in writing, upon payment of the then current fee for such letters. All third parties relying on Wood's report, by such reliance agree to be bound by our proposal and Wood's standard reliance letter. Wood's standard reliance letter indicates that in no event shall Wood be liable for any damages, howsoever arising, relating to third-party reliance on Wood's report. No reliance by any party is permitted without such agreement.