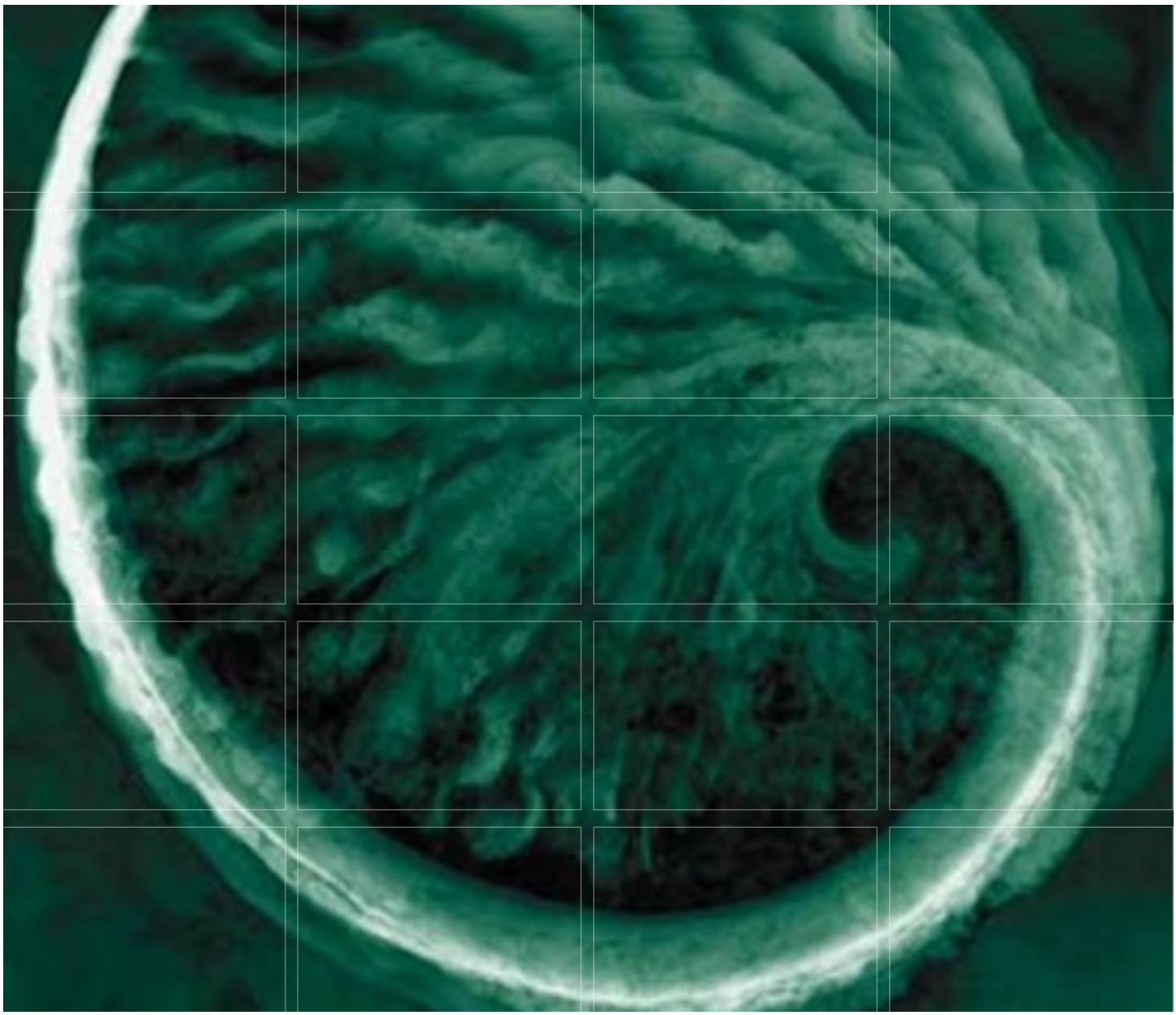
Appendix 16-B

Murray River Coal Project: Navigable Waters Assessment 2014



Prepared for:

hd Mining

MURRAY RIVER COAL PROJECT

Navigable Waters Assessment 2014

July 2014

The world's leading sustainability consultancy

ERM

HD Mining International Ltd.

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Navigable Waters Assessment 2014

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ERM Rescan
ERM Rescan Building, 15th Floor
1111 West Hastings Street
Vancouver, BC
Canada V6E 2J3
T: (604) 689-9460
F: (604) 687-4277

MURRAY RIVER COAL PROJECT

Navigable Waters Assessment 2014

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1. INTRODUCTION

HD Mining International Ltd. (HD Mining) proposes to develop the Murray River Coal Project (the Project) as a 6 million tonne per annum (Mtpa) underground metallurgical coal mine. The property is located approximately 12.5 km south of Tumbler Ridge, British Columbia (BC), and consists of 57 coal licences covering an area of 16,024 hectares (ha). The Project is located within the Peace River Coalfield, an area with a long history of metallurgical grade coal mining, mainly from open pit mining. HD Mining is proposing to access deeper zones of the coal field (600 to 1,000 metres [m] below surface) through underground mining techniques.

The assessment presented in this report supports the environmental assessment (EA) of the effects of the Project on the public use (i.e., commercial, recreational and Aboriginal) of surface waterways for navigation.

2. REGULATORY CONTEXT

There is a public right to transit navigable waters in Canada that is protected under common law. This right to navigation can only be restricted by an Act of Parliament, such as the *Navigation Protection Act* (NPA 2012). The NPA, formerly named the *Navigable Waters Protection Act* (NWPA; 1985), was subject to amendments in the *Jobs and Growth Act* (2012b) that came into effect on April 1, 2014. The right to navigate and the NPA only apply to "navigable" waters. The List of Scheduled Waters (Transport Canada 2014) are all considered navigable and are subject to the NPA. All other works built on unlisted waters are subject to common law; however, a proponent may opt in to have proposed works regulated under the NPA if the common law right of navigation is likely to be infringed.

The waters identified to be affected by the Project are not included in the NPA List of Scheduled Waters. (Transport Canada 2014). The creeks/rivers assessed in this report are all subject to common law. In order to assess if the works would be considered to be navigable under common law, information regarding physical characteristics, accessibility, and public utility have been compiled for each identified crossing.

3. NAVIGABLE WATERS SETTING

The following sections describe factors that are relevant to the determination of which waterways affected by the Project are considered 'navigable'. These factors include the physical characteristics of waterways that affect their navigability, as well as factors pertaining to the accessibility and public utility of waterways (including current and past commercial, recreational, and Aboriginal access and use) within and around the Project footprint.

3.1 PHYSICAL SETTING

3.1.1 General Environmental Setting

The Murray River Coal Project lies entirely within the Murray River watershed. It encompasses the mainstem of Murray River, as well as Camp Creek (M20 Creek), Twenty Creek, Mast Creek, M17 Creek, and M19 Creek. Camp and Twenty creeks on the west side and M17 and M19 creeks on the east side flow into the Murray River. Mast Creek is one of tributaries of the Wolverine River, which confluences with the Bullmoose River at Tumbler Ridge, and continues to flow north-east and downstream into the Murray River (Figure 3.1-1).

The mid and headwater regions of Mast, Camp, Twenty, M17, and M19 creeks are densely forested with some rock outcrops. Resource activities within the drainage basins include forestry, mineral exploration and mining, natural gas processing plants, and natural gas pipelines, along with associated access roads.

The hydrologic regime is closely related to the seasonal distribution of precipitation and temperature. Rivers in this area are predominantly fed by spring snowmelt (freshet) and secondarily by rain storms in summer. High flows occur from mid-April through July, with a low flow period during winter and early spring. The boating season on Murray River is May through October. Ice-cover through the winter precludes navigability.

3.2 NAVIGATIONAL PUBLIC USE SETTING

3.2.1 Non-traditional Land Use and Navigation Setting

Existing tourism attractions and tourist activities within and near LSA and RSA are focussed on the outdoor environment, along with the paleontological discoveries in the region (Economic Growth Solutions Inc. 2008). Most recreational activities are non-commercial and include wildlife viewing, fishing, hiking, snowmobiling, and all-terrain vehicle (ATV) use. The area has a network of recreational trails, with over 40 trails actively used by hikers, trail runners, snowmobilers, and ATV riders.

The Murray River is popular for canoeing and river boating. There are two boat launches on Murray River, one in Tumbler Ridge, and one located at the Murray River FSR crossing, adjacent to the Project.

Kinuseo Falls, a 60 m waterfall on Murray River, located approximately 65 km from Tumbler Ridge, and 38 km upstream from the Murray River Project is a popular destination for boaters. Rocky Mountain Trench Adventures and TR Gallery Framing operate jet boat tours on the Murray River.

No provincially-licenced commercial angling takes place on Murray River or its tributaries. However, Murray River provides recreational fishing opportunities for grayling, bulltrout and whitefish (L. Reynan, pers. comm.). The tributary streams are not fishing destinations.

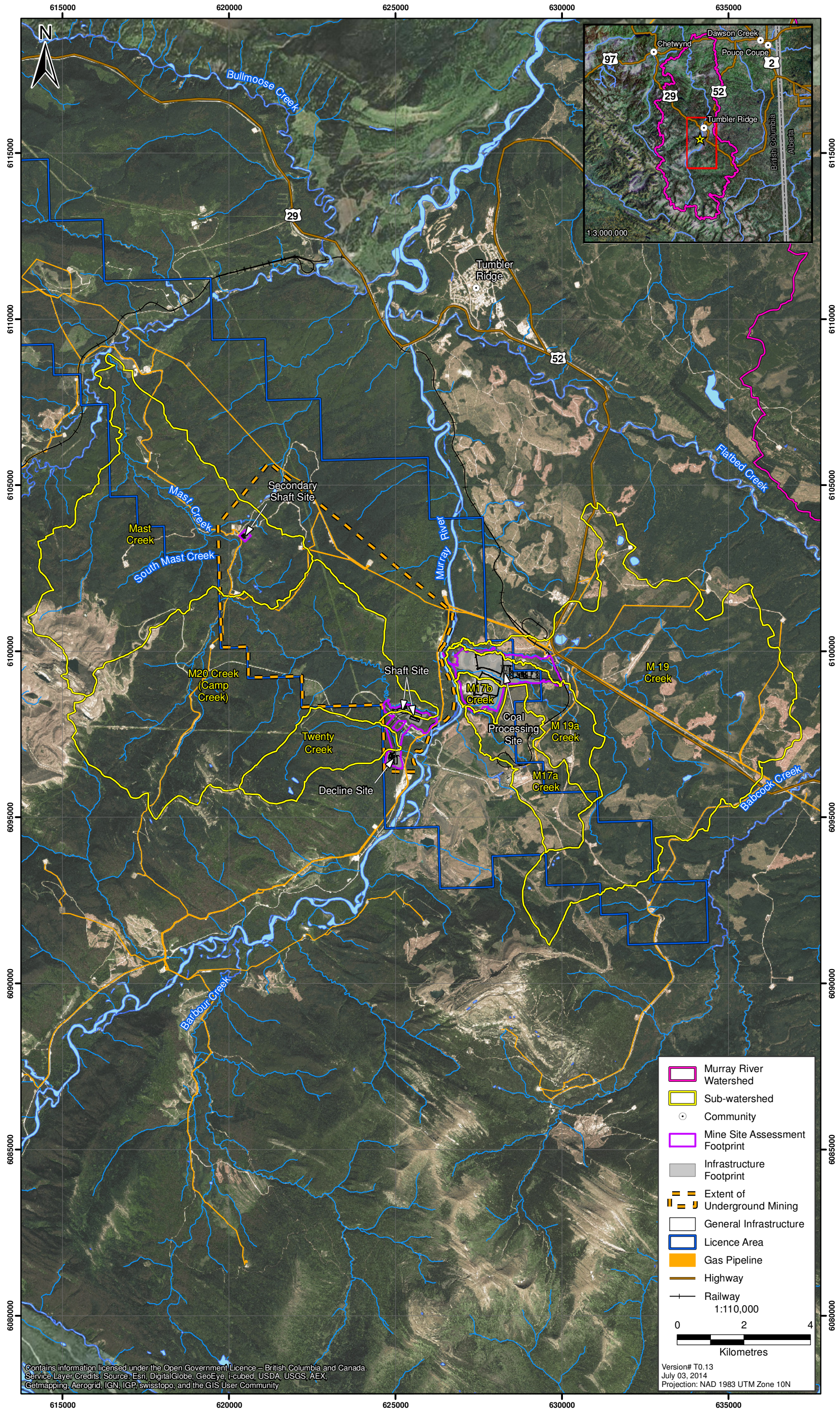
3.2.2 Current Use of Lands and Resources for Traditional Purposes

Information on current use of lands and resources for traditional purposes in the LSA by Aboriginal groups has been collected through a combination of desk-based research, field studies and consultation and engagement activities. The Project lies within lands covered by Treaty 8. The Treaty 8 nations addressed in this study include West Moberly First Nations (WMFN), Saulteau First Nations (SFN), McLeod Lake Indian Band (MLIB), Blueberry River First Nations (BRFN), and Horse Lake First Nation (HLFN). HD Mining has been engaging with these groups to better understand their current land and resource use in the area surrounding the Project.

The Murray River has been noted as a frequently used water route travelled by boat by SFN members, including fishing spots near Tumbler Ridge, and travel up to Kinuseo Falls (Firelight 2014). While no specific navigation uses on Murray River have been identified by other First Nation groups, it is anticipated that their use would be similar to that of SFN.

Figure 3.1-1

Murray River and Tributary Watershed Boundaries



4. PROJECT DESCRIPTION

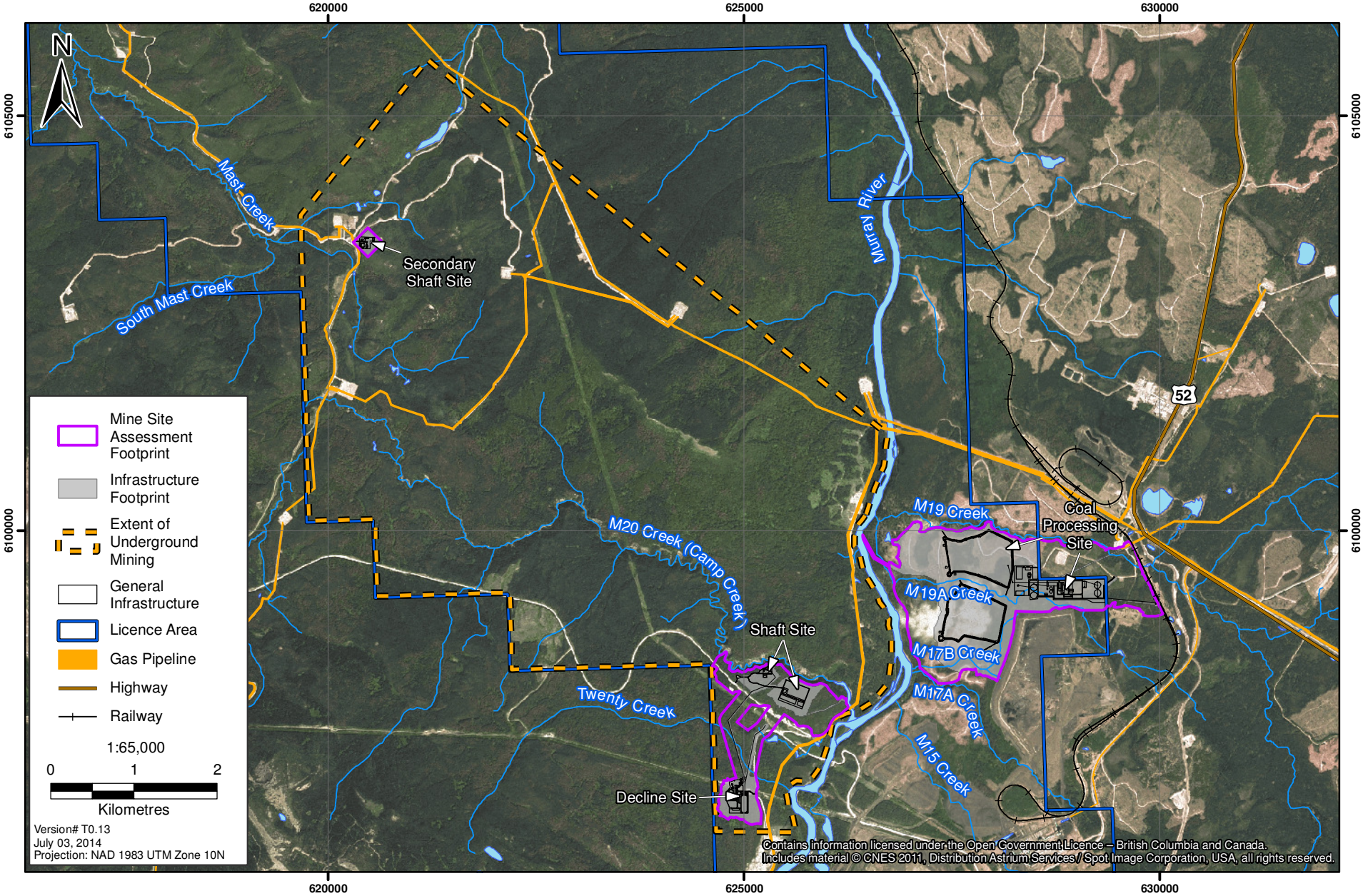
The proposed Project site general layout is shown in Figure 4-1. The site is divided into five (5) areas: Decline Site, Shaft Site, Coal Processing Site, Secondary Shafts Site, and Underground Mine. Table 4-1 summarizes the main Project components relative to these five areas. Based on the site layout, Project components that are anticipated to interact with local waterways are filled grey.

Table 4-1. Project Components

Project Component	Decline Site	Shaft Site	Coal Processing Site	Secondary Shafts Site	Underground Mine
Underground mine and associated works (e.g., main access shaft, ventilation shaft for return air, ramps, portals, tunnels)	-	-	-	-	X
Waste rock storage facilities	-	X	-	-	-
Overburden and soil storage areas	X	X	X	X	-
Coal rejects storage area	-	-	**X**	-	-
Equipment and fuel storage areas and facilities	X	X	X	-	X
Maintenance, administration and warehouse facilities	X	-	X	-	X
Coal handling and preparation facilities (e.g., washing plant)	-	-	X	-	-
Coal conveyors	-	-	X	-	X
Rail loadout	-	-	**X**	-	-
Contact water collection ditches, sedimentation pond(s) and water management structures, including a discharge pipeline	X	X	**X**	-	-
Non-contact water diversion ditch network and sedimentation pond(s)	X	X	X	-	-
Water supply facilities (e.g., groundwater extraction well)	X	-	X	-	-
Sewage treatment and disposal facilities	X	-	X	-	-
Electricity transmission line connecting to the existing BC Hydro grid and related infrastructure	**X**	-	-	-	-
Natural gas pipeline connecting to existing infrastructure and related sub-station infrastructure	-	-	**X**	-	-

In general, the Coal Processing Site is located immediately adjacent to M19A Creek, and multiple interactions with the creek may be anticipated.

Figure 4-1
General Project Layout - Surface Facilities



HD Mining has engaged Pacific Northern Gas (PNG) to supply natural gas from their existing network. A short pipeline (approximately 800 m) will be installed to supply the Coal Processing Site. The proposed pipeline corridor is approximately 20 m wide and crosses M19 Creek (10U 629396 6099724).

HD Mining will construct a 1.3 km long 230 kV transmission line from the existing BC Hydro line to a substation/distribution hub at the Decline site. Power to the Shaft Site will be connected to a secondary substation via a 10 kV line from the main power substation at the Decline Site. These power lines will cross Twenty Creek and an unnamed tributary of Murray River.

The Rail Loadout will be constructed east of the Coal Processing Site. A single linear track is planned that parallels the existing CN Rail line. The track will have a total length of 5,500 m. Upgrades and construction on the line will include crossings over M19 Creek and M19A Creek.

A water pipeline is proposed to discharge excess water from the Project to Murray River. Design drawings for the outfall are not yet available; however, the pipeline and outfall infrastructure will be located along the right bank of Murray River and will represent an instream obstruction (10U 626412, 6099955). The works would not be expected to limit navigability. Appropriate measures (e.g., signage, bouys) will be in place to alert boaters and clearly mark the location of any instream works.

5. IDENTIFYING AND SCREENING STREAM CROSSINGS

A GIS analysis was conducted to determine the potential for interaction between Project works with water. Both direct (i.e., in, on, over, under, through or across) and indirect (i.e., downstream flow effects) interactions were considered and are shown in Figure 5-1. A total of 18 crossings were identified (Table 5-1).

Figure 5-1
Identification of Stream Crossings that Intersect with the Project Layout

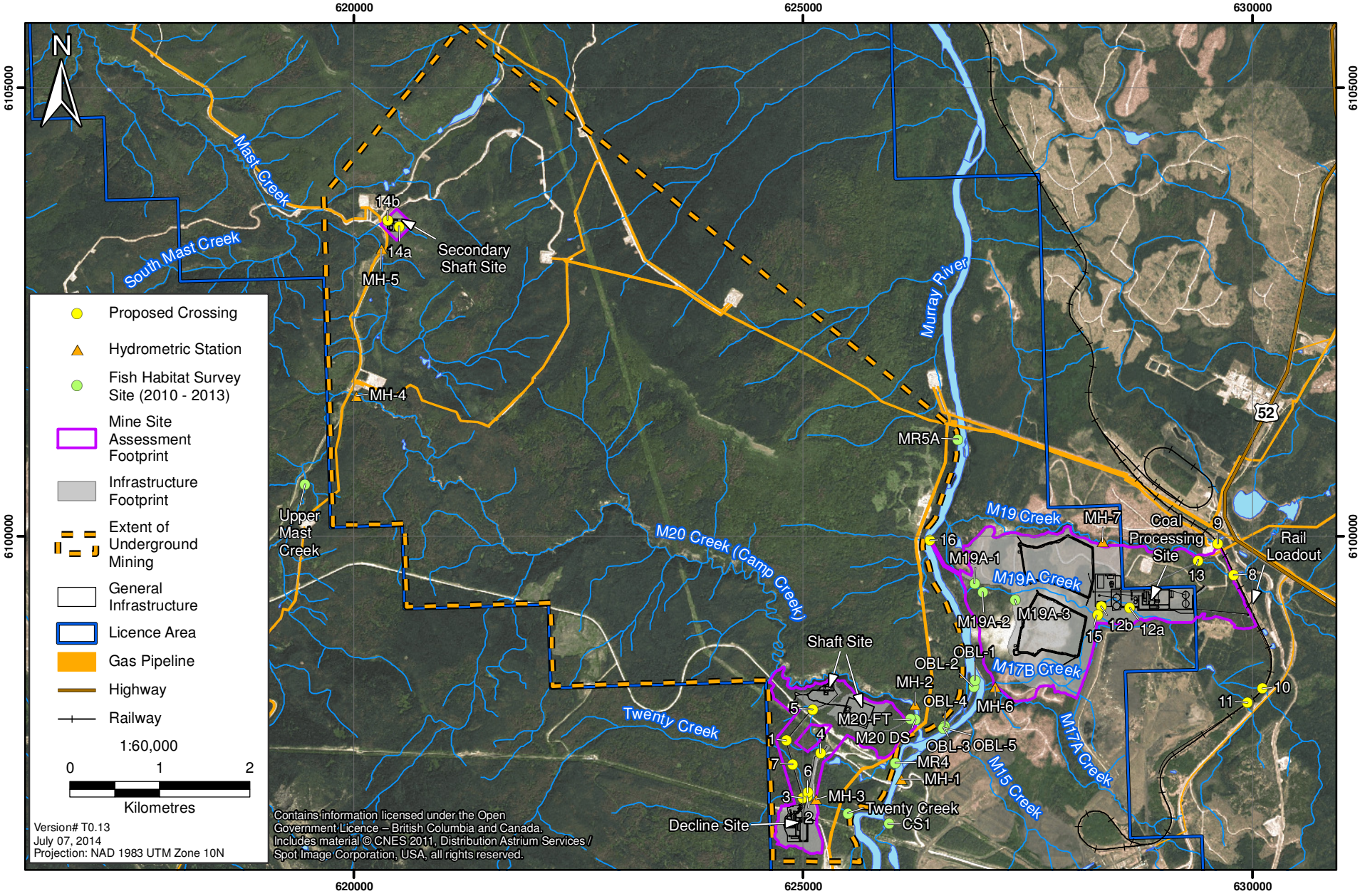


Table 5-1. Identified Stream Interactions and Type of Work

Stream Information								Works Evaluation	
Waterbody	Site ID	UTM Easting (Zone 10U)	UTM Northing (Zone 10U)	Longitude	Latitude	Impacted Stream Length (m)	Bankfull Width at Crossing[1]	Type of Work	Type of Interaction
Unnamed (trib of Murray River)	1	624811	6097723	-121.0482	55.0107	<3	<5	Power Line	Crossing
Unnamed (trib of Twenty Creek)	2	625044	6097097	-121.0449	55.0050	<3	<5	Power Line	Crossing
Unnamed (trib of Twenty Creek)	3	624995	6097084	-121.0456	55.0049	<3	<5	Power Line	Crossing
Unnamed (trib of Murray River)	4	625196	6097586	-121.0423	55.0094	<3	<5	Power Line	Crossing
Unnamed (trib of Murray River)	5	625108	6098071	-121.0434	55.0137	<3	<5	Power Line	Crossing
Twenty Creek	6	625053	6097142	-121.0447	55.0054	<3	<5	Power Line	Crossing
Twenty Creek	7	624885	6097457	-121.0472	55.0083	<3	<5	Power Line	Crossing
M19 Creek	8	629792	6099570	-120.9695	55.0260	<3	-	Rail Siding Upgrade	Crossing
Unnamed (trib of M19 Creek)	9	629613	6099921	-120.9722	55.0292	<3	-	Rail Siding Upgrade	Crossing
M19A Creek	10	630113	6098303	-120.9651	55.0145	<3	-	Rail Siding Upgrade	Crossing
Unnamed (trib of M19A Creek)	11	629942	6098147	-120.9679	55.0132	<3	-	Rail Siding Upgrade	Crossing
M19A Creek	12b	628316	6099217	-120.9928	55.0232	400	-	Coal Processing Site	Covering
M19A Creek	12a	628634	6099201	-120.9878	55.0230	<3	-	Coal Processing Site	Covering
M19 Creek	13	629396	6099724	-120.9757	55.0275	20	-	Gas Pipeline Connection	Crossing
Unnamed (trib of Mast Creek)	14a	620377	6103526	-121.1151	55.0639	150	-	Secondary Shaft Site	Covering
Unnamed (trib of Mast Creek)	14b	620507	6103455	-121.1131	55.0632	<3	-	Secondary Shaft Site	Covering
M19A Creek	15	628277	6099121	-120.9934	55.0224	<3	-	Access Road	Crossing
Murray River	16	626412	6099955	-121.0222	55.0303	<3	-	Water Discharge Pipe	Instream Obstruction

6. DETERMINING NAVIGABILITY OF AFFECTED WATERS

The navigability of waters is assessed in this report based on the principles and criteria built up through jurisprudence, incorporating available information gathered from stakeholder consultations for the Project relating to navigational public utility.

For large streams/rivers, such as Murray River, navigability is clearly established. For smaller streams/creeks, where navigability is not already established, general principles on the public right to navigate are applied as described below.

Field data on streams potentially affected by the Project were collected as part of the Fisheries and Hydrology baseline field programs (Rescan 2013).

6.1 DETERMINING IF A WATERWAY IS PHYSICALLY CAPABLE OF PUBLIC NAVIGATION

A waterway is navigable if it can be demonstrated that it can support navigation by floating vessels that may be as small as canoes or rafts. This physical navigational capability may be observed, found in desk studies, reported through consultation, or be surmised from the physical properties of the waterway.

However, simply having a sufficient width and depth at certain times of the year doesn't necessarily make a water body navigable. The intent of the law is to protect the reasonable, normal, and regular public right of passage along waterways that can serve as aqueous highways for travel or transport. Therefore, *temporal* and *obstruction* factors need to also be considered.

Temporally, navigation need not be continuous across all seasons in order for a given section to be considered navigable; however, navigable waters should support a regular, reliable means of aqueous travel or transport throughout the ice-free months of the year.

In general, if a waterway section is affected by conditions that would prevent or obstruct the passage of a floating vessel (such as being too shallow, clearly obstructed, or marshy), then that section would not be considered capable of navigation. The same river/creek may be navigable along certain reaches, and not navigable along other reaches.

If a waterway has no historic or current record of use, and the ability to physically transit the waterway as an aqueous highway is met with multiple obstacles which would make passage onerous, then the waterway would reasonably not be considered navigable. For this assessment, for a waterway section with no established utility for navigation, if it has three or more obstructions to passage it is considered not navigable.

6.2 DETERMINING NAVIGABILITY BASED ON SOCIAL UTILITY

Along with having the appropriate physical criteria, a waterway must also be able to serve as an aqueous highway that is of reasonable public utility leading to some sort of social benefit of navigation. The navigational use may be for various purposes including for commercial, recreational, or Aboriginal subsistence travel or transport, or as a communications link.

If a given waterway meets the physical criteria to support navigation, but has no established/reported navigational use, then further criteria are required to speak to the waterway's ability to reasonably be of public utility for navigation.

The ability of the public to be able to access both ends of a waterway is a precondition to the navigability of a waterway. The waterway should also form part of a larger system of connectivity for travel or transport. If a waterway does not meet access and connectivity criteria, then it is not considered navigable.

7. ASSESSMENT OF NAVIGABILITY

7.1 MURRAY RIVER

Murray River (Site ID 16) is clearly navigable. The river has been monitored by HD Mining as part of baseline environmental studies from 2011 through 2014. Recreational boating use has been observed during baseline data collection. A bathymetric survey of a 5 km reach from upstream of the Murray River FSR bridge to below M19 Creek was conducted by ERM Rescan, EDI and McElhanney in May 2013 using a jet boat. Plates 7.1-1 to 7.1-4 illustrate the channel morphology of the river, including the right bank conditions near the proposed water discharge pipeline location.

Plate 7.1-1. Murray River: aerial view looking downstream. Flow rate = 20 m^3/s. September 26, 2012.

Plate 7.1-2. Murray River: view upstream at the Murray River FSR Bridge. Flow rate = 53 m^3/s. A public access boat launch area is located adjacent to the bridge. April 28, 2012.

Plate 7.1-3. Murray River: view downstream from Murray River FSR bridge. Flow rate = approx. 80 m³/s. November 7, 2012.

Plate 7.1-4. Murray River: view downstream toward proposed water pipeline discharge location on right bank. Flow rate = 145 m³/s. M19 Creek joins the Murray River on the right bank in the distance. May 23, 2013.

7.2 POWER LINE CROSSINGS

Seven of the stream crossings that were identified in Table 5-1 are associated with the proposed power lines (Site IDs 1 through 7). The largest of these crossings (Twenty Creek), is illustrated in Plate 7.2-1.

Plate 7.2-1. Twenty Creek: view downstream from hydrometric station MH-3. Several branches create low clearance along the reach. April 27, 2012.

All seven of these works would have been considered minor works under NWPA (1985) based on the following criteria:

- the width of the navigable waters that the cables are over or across is less than 15 m, as estimated using Google Earth Pro imagery;
- the works will meet the design and construction requirements of Overhead Systems, CAN/CSA-C22.3 No. 1-10;
- the works are more than 1,000 m away from any lake or tidal waters;
- the works are not over or across charted navigable waters, a proposed dam, weir, or headpond;
- the works are not over or across a canal that is accessible to the public; and
- the works do not include towers or poles within the navigable waters.

Potential effects to navigability at these sites can be managed as minor works during construction, and would not be expected to influence navigability after installation. These seven crossings are therefore screened out from further assessment.

7.3 UNNAMED TRIBUTARY NEAR THE SECONDARY SHAFT SITE

7.3.1 Physical Criteria

A small headwater tributary of Mast Creek passes through the area of the Secondary Shaft Site infrastructure layout (Site IDs 14a and 14b). Mast Creek was monitored by ERM Rescan from 2011-2012 as part of the hydrometric monitoring network. The channel at the station (MH-5) is comprised of a soft, silt bed.

The physical data collected during hydrology cross-sectional surveys on MH-5 (Mast Creek) indicate average bankfull width and depths of 5.8 m and 1.2 m respectively, potentially allow room for navigation of a small vessel during high flow conditions (Plate 7.3-1). However, Mast Creek is a low energy stream that contains wetland areas that would slow navigation. The tributary that interacts with the Secondary Shaft Site has a smaller catchment area than MH-5 (4.12 km²) and is likely smaller in size with lower flows. Mast Creek at MH-5 is considered not reasonably capable of supporting navigation due to the size and shape of it and low flows. Therefore, the smaller tributary of Mast Creek affected by the Secondary Shaft Site is considered to be not reasonably capable of supporting navigation.

Plate 7.3-1. Mast Creek: view upstream at hydrometric station MH-5. Large amounts of vegetation establish on the banks each summer. June 25, 2012.

7.3.2 Obstruction to Navigation

No obstructions in the tributary interacting with the Secondary Shaft Site have been recorded. In MH-5 some woody debris partially obstructs the channel (Plate 7.3-1). The channel morphology of

the reach around MH-5 has a sinuosity that would limit the length of any vessel attempting to navigate it.

7.3.3 Temporal Considerations

Outside the freshet period (e.g., May/June), flow conditions in the headwater creeks are low very low (e.g, 28 L/s on 26-Jun-2012 down to 3 L/s on 28-Sep-2012 at MH-5). These flow rates are not capable of supporting navigation, thus this stream is not capable of supporting a regular, reliable means of aqueous travel during the boating season.

7.4 M19 CREEK

7.4.1 Physical Criteria

Three crossings of M19 Creek were identified (Site IDs 8, 9 and 13). M19 Creek has been monitored by ERM Rescan since 2012 as part of the hydrometric monitoring network (station MH-7). The channel morphology at the station is bedrock and is located in a deeply incised ravine (Plate 7.4-1).

Plate 7.4-1. M19 Creek: view downstream from hydrometric station MH-7. Several logs have fallen across the stream and the edge of the waterfall can be seen in the distance. April 17, 2014.

The physical data collected during hydrology cross-sectional surveys on M19 Creek indicate a bankfull depth at the hydrometric station location of 0.8 m. This limits the floatability of the creek, even during high flows. Due to the shallow depth of M19 Creek, it is considered not reasonably capable of supporting navigation.

7.4.2 Obstructions to Navigation

Approximately 10 m downstream from the station location there is a small waterfall and many logs obstruct navigation at the station location (Plate 7.4-1). From the station location 3 obstructions can be seen; the waterfall, one log upstream and one log downstream.

7.4.3 Temporal Considerations

No documentation has been found that reveals historic or future use of this stream as an aqueous highway. M19 Creek generally has ice cover from October to April. Fish habitat surveys in late-August to October indicate that M19 may become seasonally dewatered (ERM Rescan 2014a).

7.4.4 Public Access and Connectivity

Access to M19 Creek downstream of the CN Rail crossing is limited. Access requires the use of a UTV along a decommissioned forestry road and a 250 m hike into the ravine. Access to the confluence of M19 Creek and the Murray River is only accessible by boat or hiking.

7.5 M19A CREEK

7.5.1 Physical Criteria

Five crossings of M19A Creek were identified (Site IDs 10, 11, 12a, 12b, 15).

Fish habitat surveys were conducted in 2013 along M19A Creek (M19A-1, M19A-2 and M19A-3; ERM Rescan 2014a). The channel morphology is riffle-pool with a gravel bed. The average bankfull width and depths surveyed, 1.5 m and 0.3 m respectively, limits the floatability of the creek, even during high flows (Plate 7.5-1). Due to the narrow width and depth of M19A Creek, it is considered not reasonably capable of supporting navigation.

7.5.2 Obstructions to Navigation

Two of the sites (Site IDs 10 and 11) are located at existing crossings of M19A Creek along the CN Rail right-of-way. The decommissioned forestry road bridge that crossed M19A Creek approximately 1 km upstream of the confluence with Murray River has been removed. Beaver dams and log jams were documented in the lower reaches of this stream during fisheries habitat surveys (ERM Rescan 2014a).

7.5.3 Temporal Considerations

Similar to all creeks within the area, M19A Creek has ice cover from October to April. No documentation has been found that reveals historic or likely future use of this stream as an aqueous highway.

7.5.4 Public Access and Connectivity

Upstream of the Project, M19A Creek is crossed by a gravel logging road and by the existing CN Rail rail grade that parallels it. Culverts exist to covey the flow beneath these structures.

Plate 7.5-1. M19A Creek: view downstream during high flow conditions. June 14, 2013.

8. SUMMARY

The Murray River Project will involve multiple components that will interact with surface waters in the area. Nineteen interactions were identified through GIS analysis of proposed Project infrastructure and stream/river layers. Seven of these crossings are associated with power line crossings. Potential effects to navigability at these seven sites can be managed as minor works during construction, and the power lines would not be expected to influence navigability after installation.

For potential crossings of other tributaries of Murray River (e.g., M19, M19A, Twenty, and Mast creeks), no documentation has been found that reveals historic or likely future use for navigation. All of these tributaries are considered not reasonably capable of supporting navigation due to physical characteristics (e.g., limited width/depth, and numerous obstructions), and flow conditions that cause the stream to be not capable of supporting a regular, reliable means of aqueous travel during the boating season.

Of all the waters assessed for navigability, only Murray River is considered navigable. A water pipeline is proposed to discharge excess water from the Project to Murray River. Design drawings for the outfall are not yet available; however, the pipeline and outfall infrastructure will be located along the right bank of Murray River and will represent an instream obstruction (10U 626412, 6099955). The works would not be expected to limit navigability. Appropriate measures (e.g., signage, bouys) will be in place to alert boaters and clearly mark the location of any instream works.

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