



5.0 TOPOGRAPHY AND SURFACE DRAINAGE

5.1 Local Topography

The surface topography in the vicinity of the CRRRC Site is shown on Figure 5-1. The topography is generally highest to the west and southwest of the Site, where ground surface elevations are as high as 105 m ASL. A local topographic high of 90 m ASL is found to the southwest of the Site along a north-south trending ridge. The topography is lowest in the north (65 m ASL), northeast (64 m ASL) and southeast (68 m ASL) portions of the area shown on Figure 5-1. Locally lower elevations resulting from erosion are found within the surface water features in the vicinity of the CRRRC Site. Major surface water features within the vicinity of the CRRRC Site (i.e., the Castor River and Bear Brook Creek) generally drain in an easterly direction following the general topographic slope.

At the CRRRC Site, the topography is flat, and varies between 76 m ASL on the east side of the Site, to 77.5 m ASL in the southwest portion of the Site.

5.2 Surface Water Drainage

5.2.1 Natural Watercourses

There are four main natural watercourses within five kilometres of the CRRRC Site. Bear Brook Creek is 3.4 kilometres to the northwest of the property boundaries, and Shaw's Creek is 1.6 kilometres to the east. Bear Brook Creek is a major tributary of the South Nation River. The North Castor River is 4.7 kilometres to the southwest of the property, while Black Creek is approximately 2.5 kilometres to the southeast. Both the North Castor River and Black Creek are part of the Castor River subwatershed and, as such, are isolated by the subwatershed boundary from receiving potential drainage from the CRRRC Site. The approximate boundary between the Bear Brook Creek subwatershed and the Castor River subwatershed is shown on Figure 5-2.

The communities of Edwards, Carlsbad Springs, Bearbrook, Cheney and Bourget are located along tributaries or sections of Bear Brook Creek. There are no municipal surface water intakes, with these communities primarily relying on groundwater or municipal systems for their water supply (South Nation Conservation Authority, 2012). The two closest of these communities are Edwards and Carlsbad Springs, located about two kilometres west and just over three kilometres north, respectively, from the Site. The other three communities are more than 10 kilometres east of Carlsbad Springs.

Water quality monitoring information for Bear Brook Creek is available from the City of Ottawa Water Environment Protection Program (WEPP). Water level information is available from the hydrometric data (HYDAT). The City of Ottawa WEPP sampled in various locations of the Bear Brook Creek Watershed, including a location near Carlsbad Springs, just north of the CRRRC Site (see location on Figure 5-2). The HYDAT station (No. 02LB008) within Bear Brook Creek is located near Bourget approximately 20 kilometres east of the CRRRC Site (east of the map area shown on Figure 5-2).

The water quality in Bear Brook Creek is reflective of the rural, agricultural population in its vicinity. According to the City of Ottawa Water Environment Protection Program (WEPP) 2008 to 2014 data for Bear Brook Creek (City of Ottawa, 2014), 0% to 44% of the phosphorus, *E.coli* and copper in water quality samples meet provincial and federal targets and 95% to 100% of zinc samples meet provincial and federal targets.

The average daily discharge at HYDAT station 02LB008 for 2001 to 2010 is 7.42 cubic metres per second (m^3/sec). This represents seven years of data as the records were incomplete for 2001, 2004 and 2007.



5.2.2 Constructed Watercourses

Watercourses in the form of ditches and drains are present on the CRRRC Site. In general, these are extensions of municipal drains in the vicinity of the property, or of municipal drains and their branches that originate from the property. Refer to Figure 2-2 for the location of constructed watercourses within the vicinity of the CRRRC Site.

The constructed watercourses that are on or near the CRRRC Site are as follows:

- DD1 – Originates within the CRRRC Site. It is an extension of the Regimbald Municipal Drain and is on a west to east orientation. It is located on the northern portion of the Site;
- Simpson Municipal Drain – Crosses the Site, entering from the west and exiting on the east. The municipal drain is on a west to east alignment and travels approximately 1.8 kilometres from the east boundary of the property, eastward under Highway 417 before turning southeast, continues as Shaw's Creek which eventually feeds Bear Brook Creek. The streamflow distance from the Simpson Municipal Drain at the CRRRC Site east boundary to Bear Brook Creek is approximately 11.4 kilometres;
- DD2 – Originates within the CRRRC Site and is on a west-east orientation. It is an extension of the Frank Johnston Municipal Drain, which drains into the Wilson Johnson Municipal Drain prior to discharge to Shaw's Creek. DD2 is located on the southern half of the CRRRC Site. Surface drainage from the Site boundary will travel approximately 1.3 kilometres before reaching the municipal drain system, which travels another 820 metres, crosses under Highway 417 and joins the Simpson Municipal Drain at Shaw's Creek. The streamflow distance from the CRRRC Site boundary to Shaw's Creek is approximately 2.1 kilometres;
- DD3 – Is a manmade surface water feature, approximately 800 metres in length, surrounding three sides of the former scrapyards property on the west central side of the Site. DD3 is an isolated incised constructed channel that may have a tenuous connection with DD2 during periods of high water; and,
- Regimbald Municipal Drain – Another extension of the Regimbald Municipal Drain is located near the northwest boundary of the Site on the north side of Highway 417. Initially aligned in a southeast to northwest direction, it then runs east, and flows southeast to join the Simpson Municipal Drain. Little or no drainage from the Site flows to this extension of the Regimbald Municipal Drain.

As noted above, all drainage discharge from the CRRRC Site eventually combines in the Simpson Municipal Drain, continues as Shaw's Creek and eventually discharges to Bear Brook Creek.

The Bear River Municipal Drain is located approximately 1.4 kilometres to the west of the Site. It is a municipal drain with permanent flow that makes its way north for approximately 5.1 kilometres and discharges into Bear Brook Creek. The Bear River Municipal Drain does not receive drainage directly from the CRRRC Site.

Municipal drain details from the Fisheries and Oceans Canada (DFO) Drain Classification Database are presented in Table 5-1.



Table 5-1: Municipal Drain Details for the CRRRC Site

Municipal Drain Name	Flow	DFO Classification Type
Regimbald	Intermittent	F
Simpson	Intermittent	F
Wilson Johnston	Intermittent	F
Bear River	Permanent	B

All municipal drains on the CRRRC Site are intermittent and DFO Class F. However, the Bear River Municipal Drain has permanent flow and is DFO Class B; as described above, this does not receive drainage from the Site.

5.2.3 Existing Surface Water Outlet Points

Three drainage areas were delineated for the CRRRC Site and are presented on Figure 5-3.

Surface water generally flows into ditches and channels or sheet flows to three outlets:

- Surface drainage from the northeast portion of the Site is collected by DD1, and directed to the Regimbald Municipal Drain on the northeast border of the property.
- The central portion of the CRRRC Site is drained by the Simpson Municipal Drain, which exits out the east border and is eventually joined by the drainage from the northeast portion.
- The south portion of the Site drains to DD2, exits out the east property boundary and continues to flow until it reaches the Wilson Johnston Municipal Drain, which connects with the Simpson Municipal Drain at Shaw's Creek.