TECHNICAL MEMORANDUM

DATE September 12, 2024 **Project No.** CA-EI-CW238404

TO Deighen Blakely
Drumheller Resiliency and Flood Mitigation Office

CC Josh Strukoff

FROM Julie Benedik **EMAIL julie.benedik@wsp.com**

DRUMHELLER RESILIENCY AND FLOOD MITIGATION PROGRAM – TERRESTRIAL ASSESSMENT OF ROSEDALE: WETLAND AND WILDLIFE TECHNICAL MEMORANDUM

1.0 INTRODUCTION

The Town of Drumheller (Drumheller) is located within the Red Deer River valley in southeastern Alberta. Historically, Drumheller has experienced numerous floods, resulting in significant damage to properties and infrastructure. Over the last 30 years, flooding occurred in 1991, 2005, 2013, and 2018. The Drumheller Resiliency and Flood Mitigation Program (DRFM Program) aims to complete a flood mitigation system that provides flood protection while meeting the following conditions:

- Easily maintainable
- Erosion resistant
- Accommodates deterioration over time
- Minimizes encroachments on the river and associated afflux
- Minimizes impacts on private land
- Considers the existing structural measures such as berms along riverbanks as well as construct new structures

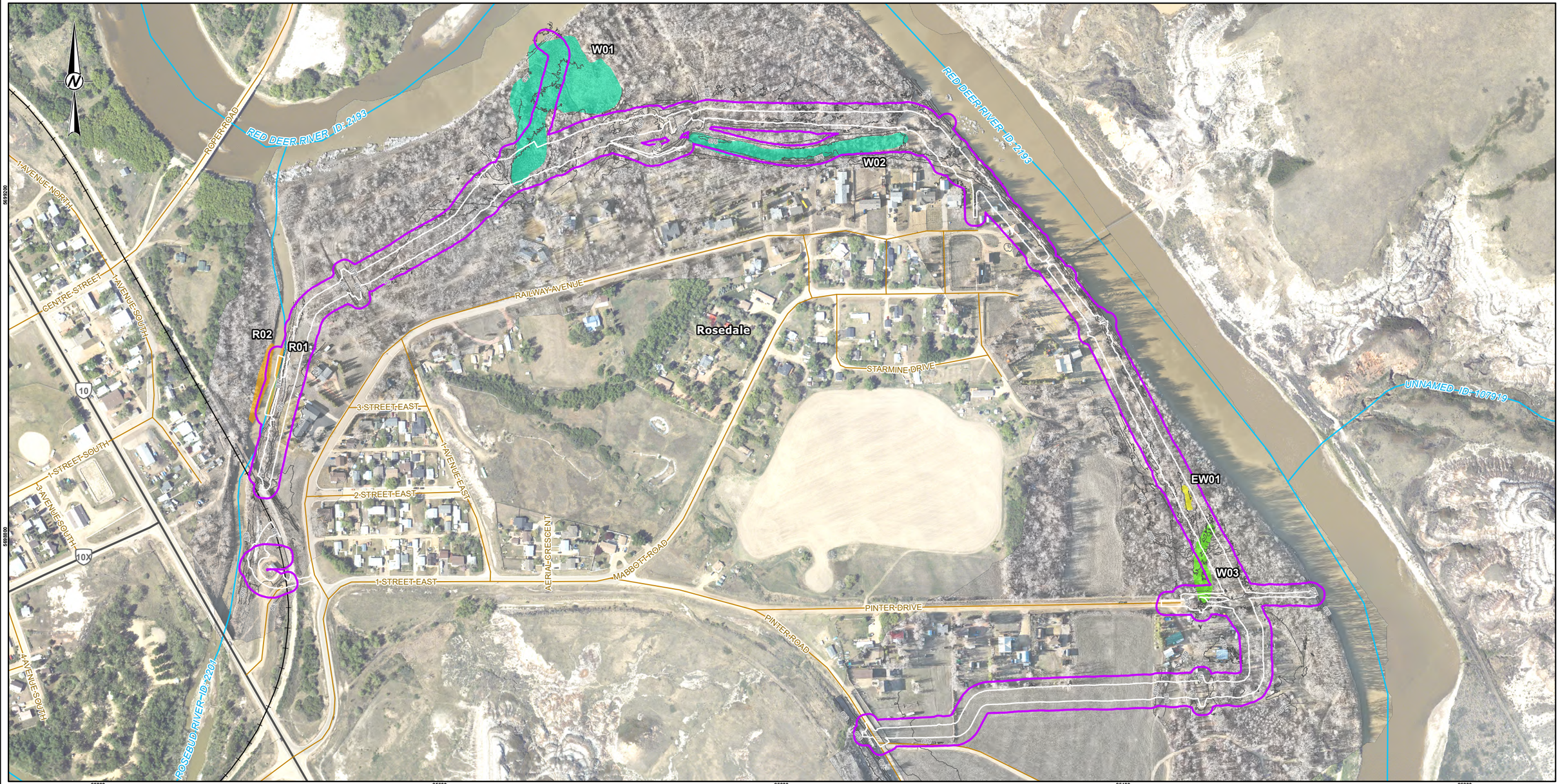
Drumheller has retained WSP Canada Inc. (previously Wood E&I) to complete a terrestrial assessment (i.e., vegetation and wildlife) related to the Rosedale Berm, as part of the larger DRFM Program.

WSP completed a terrestrial and tree health assessment in May and June, 2024 for the Rosedale Project Study Area (PSA) proposed for flood mitigation along the Red Deer River by the DRFM Program. The PSA includes the preliminary Project footprint plus a 10 m buffer. The field data collected were used to inform updates to the berm design to minimize impacts to wetlands (see Section 6.0). The current Project footprint plus 10 m buffer is shown in Figure 1. This memorandum is intended to report data collected from the 2024 terrestrial assessment by identifying wet areas (i.e., riparian and wetland areas), and notable wildlife features within Rosedale PSA.

2.0 STUDY AREA

The Rosedale PSA extends for approximately 2.3 km and is located in the SW and SE Subsections of Section 28, Township 28, Range 19, West of the Fourth Meridian (W4M) (SW- and SE- 28-028-19 W4M), and the NE Section of Section 21, Township 28, Range 19, W4M (NE-21-028-19 W4M). The PSA is located within the Northern Fescue Natural Subregion of the Grassland Natural region. This subregion is dominated by plains rough fescue (*Festuca hallii*) and forms dense stands on undisturbed sites, on lightly grazed sites it commonly occurs with western porcupine grass (*Hesperostipa curtiseta)*, slender wheat grass (*Elymus trachycaulus* ssp. *trachycaulus*), Hooker's oatgrass (*Helictochloa hookeri*), and a variety of perennial herbs (e.g., prairie crocus [*Pulsatilla nuttalliana*], prairie sagewort [*Artemisia ludoviciana*], wild blue flax [*Linum lewisii*], northern bedstraw [*Galium boreale*], and three-flowered avens [*Geum triflorum*]). Sparsely vegetated grasslands include blue grama grass (*Bouteloua gracilis*), northern wheat grass (*Elymus lanceolatus*), prairie sandreed (*Sporobolus rigidus*), and June grass (*Koeleria macrantha*) occurring on the driest sites with coarse textured, rapidly drained Regosol and Rego Chernozem soils (NRC 2006). Tall shrub and tree communities are limited to river valleys and moist lowland sites where groundwater is adequate throughout the growing season, and are dominated by balsam poplar (*Populus balsamifera*), aspen (*Populus tremuloides*), and plains cottonwood (*Populus deltoides)* with willows (*Salix* spp.), sedge (*Carex* spp.) common cattail (*Typha latifolia),* and bulrush (*Typha* spp.*)* communities occurring in poorly drained depressions and along rivers on Gleysolic soils (NRC 2006).

The Rosedale PSA is located along the south (or right) bank of the Red Deer River with the upstream extent north of Railway Avenue in the Village of Rosedale (SW-28-028-19 W4M). Construction is scheduled to begin in spring or summer 2025, with tree clearing proposed prior to the bird window, possibly over the winter.

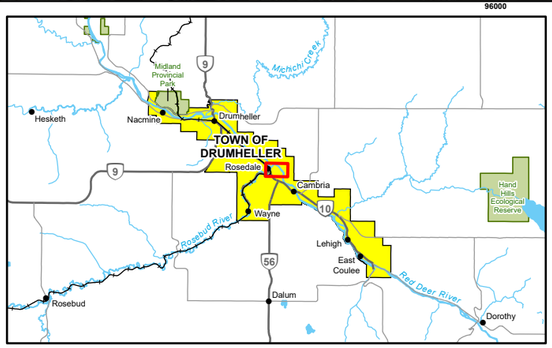


LEGEND

- PROJECT STUDY AREA (10 M OF PRELIMINARY BERM FOOTPRINT)
- PROJECT FOOTPRINT
- PRIMARY HIGHWAY
- LOCAL ROAD
- MAJOR CONTOUR (1.0M)
- WATERCOURSE (FWMIS ID)

CURRENT WETLAND, WATERBODY, AND RIPARIAN BOUNDARY

- SEASONAL GRAMINOID MARSH
- TEMPORARY SHRUBBY SWAMP
- EPHEMERAL WATERBODY
- RIPARIAN - SHRUBBY



0 100 200

1:4,500 METRES

CLIENT

DRUMHELLER VALLEY

CONSULTANT

wsp

YYYY-MM-DD	2024-09-12
DESIGNED	MP
PREPARED	HB
REVIEWED	JB
APPROVED	JB

REFERENCE(S)

1. FIELD WORK DATE: MAY 10 AND 11, 2024.
2. DRONE IMAGERY CAPTURED BY KEITH POOLE, 5 CM RESOLUTION, © 2024.
3. HIGH RESOLUTION AERIAL PHOTO FROM 2019 AND PROVIDED BY DRFMO.
4. BASEDATA CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE – ALBERTA.

SPATIAL REFERENCE: CANA83-3TM114

PROJECT

DRUMHELLER RESILIENCY AND FLOOD MITIGATION PROJECT
TERRESTRIAL ASSESSMENT OF ROSEDALE

TITLE

WETLAND AND RIPARIAN ASSESSMENT FOR THE ROSEDALE PROJECT STUDY AREA

PROJECT NO.	CONTROL	REV.	FIGURE
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3.0 ASSESSMENT METHODS

3.1 Vegetation Mapping

A desktop assessment was completed for the PSA in 2024 to distinguish wetlands from riparian areas, this included a review of current aerial imagery, historical aerial photographs, Alberta Merged Wetland Inventory (AEP 2018), LiDAR contour data (DRFMO 2018), and watercourse mapping (Government of Canada 2016). Vegetation associations differ for riparian areas (i.e., areas that have overland water flow and connect streams or upland areas to wetlands [Government of British Columbia 1998; Miller 2023]) and wetlands (i.e., areas that are adapted to soil water storage [Miller 2023]).

A review of historical aerial photographs of the PSA was completed by obtaining historical aerial photographs for selected years from Government of Alberta's (GOA) Aerial Photographic Record System (GOA 2016) and from Google Earth (Google Earth 2012). Aerial photographs from 1950, 1963,1976, 1982, 1990, 2005, and 2019 were reviewed to support the current delineation of wetland and riparian boundaries. Ortho imagery from 2019 was also reviewed to support the delineations of wetland and riparian boundaries. Dates of historical aerial photographs were selected primarily based on availability but also with reference to imagery scales, season of imagery capture, and climate data for 028-19 W4M.

A desktop interpretation of historical and recent aerial imagery was completed in conjunction with a review of topographic maps to delineate current wetland and riparian boundaries. Current wet areas were delineated through the interpretation of aerial imagery by a WSP vegetation ecologist at a scale of 1:1,500. Individual polygons were delineated based on the presence of hydrological influences, including areas of standing water, bare ground, patchy vegetation, and topography. Wetlands were classified as defined in the Alberta Wetland Classification System (AWCS) (GOA 2015) and riparian areas as defined by vegetation form (i.e., treed, shrubby, or graminoid).

Each polygon was assigned a vegetation association (i.e., riparian or wetland), based on evidence of water permanence and changes to the observed vegetation (e.g., changes in image texture and colour). Wetland vegetation associations were assigned a classification following the AWCS for wetlands (GOA 2015) or by assessing the vegetation form for riparian areas (i.e., treed, shrubby, or graminoid). All wet areas were assessed as individual, discrete polygons.

Desktop mapping was confirmed through a field survey in May 2024 by a vegetation and wetland ecologist. The entirety of the PSA was assessed, and seven plots were surveyed to characterize the wet areas.

3.2 Terrestrial Survey

3.2.1 Wetlands and Riparian Areas

Field surveys were completed on May 11 and June 24, 2024, to survey vegetation communities and soil, confirm desktop mapping, and survey additional unmapped wetland areas observed in the field. Detailed vegetation plots along the PSA were completed in areas with visual evidence of wet features.

Wetland assessments including collection of ABWRET-A data were completed for any wetlands identified. Incidental observations of noxious/prohibited weed populations were documented; UTM coordinates, and a photograph were taken when encountered.

3.2.2 Wildlife

The *Alberta Wildlife Act* protects nests, dens and hibernacula of wildlife within the province. Under the Act, it is prohibited to destroy, disturb or harass wildlife and/or their dens, nests or burrows. To comply with the Act, the Contractor must arrange for a qualified biologist to complete a pre-disturbance wildlife sweep prior to any Project activities, including the clearing of vegetation, if activities occur between March 15 and August 15. A terrestrial wildlife sweep survey was performed to assess the PSA and surrounding area for the presence of wildlife features. A qualified wildlife biologist conducted a meandering search of the PSA plus a 100 m buffer on May 10, 2024 to identify any important wildlife features such as raptor nests, active dens or burrows and other wildlife features that may be impacted during construction (GOA 2021a). As per the Wildlife Sweep Protocols (GOA 2021a) the Alberta Public Land Glossary of Terms defines wildlife sweep as: “An immediate search of the proposed development for important wildlife features, including occupied raptor nests, heron rookeries (nests), occupied dens and mineral licks. The intent is to quickly assess a site for these features so that they may be avoided. In areas where a full wildlife survey is required, sweeps do not replace the need for a full wildlife survey.” The wildlife sweep consisted of a qualified Wildlife Biologist surveying on foot the PSA on May 10, 2024, working from the most eastern portion to the most western portion within a 100m buffer of the PSA to identify any wildlife features. The survey consisted of a qualified wildlife biologist walking a meandering path of the entire project footprint including all offshoots. During the survey the biologist watched for features. Any wildlife features and incidental wildlife observations were documented, and UTM coordinates were taken along with a photograph, and photographs were taken for of the wildlife features observed.

4.0 ASSESSMENT RESULTS

4.1 Vegetation Mapping

Seven historical aerial photographs from 1950, 1963, 1976, 1986, 1990, 2005, and 2019 were reviewed to delineate current boundaries of wetlands and riparian areas in the PSA. The following summarizes the results of the desktop wetland and riparian area mapping exercise and field survey.

The historical aerial photographs and satellite imagery show that the PSA remains largely undeveloped along the northern and eastern portions of the PSA, while the western and southern portions are primarily cleared. The wet areas vary between images, but shrubby riparian areas, shrubby swamps, an ephemeral waterbody, and a seasonal graminoid marsh are all visible during various years of the imagery (Appendix A – Figure A-1 to A-7).

In the 1950 photograph, the wet area along the most western portion of the PSA and the east side of the tributary is classified as a shrubby riparian area (R01), shrubby swamp W01 is not visible, shrubby swamp W02 appears as part of a larger floodplain, the majority of the eastern portion of the PSA appears as a sandbar, and neither EW01 nor W03 are visible (Appendix A – Figure A-1).

In the 1963, 1976, 1982, and 1990 photographs, the shrubby riparian areas (R01 and R02) are somewhat visible on either side of the tributary in the western portion of the PSA (Appendix A – Figures A-2 to A-5). In the northern section of the PSA, shrubby swamp W01 is visible, appearing to be anthropogenic in origin, and shrubby swamp W02 is visible, appearing to part of a larger floodplain. Directly north of the PSA, adjacent to W01, an area is visible where trees have been cleared and soil has been removed to create a depression that is collecting water. In these images, it is difficult to see EW01 and W03 as they are both located within a treed area. In the 1976, 1982, and 1990 photographs, trails are visible along the river and through the treed area in the northcentral

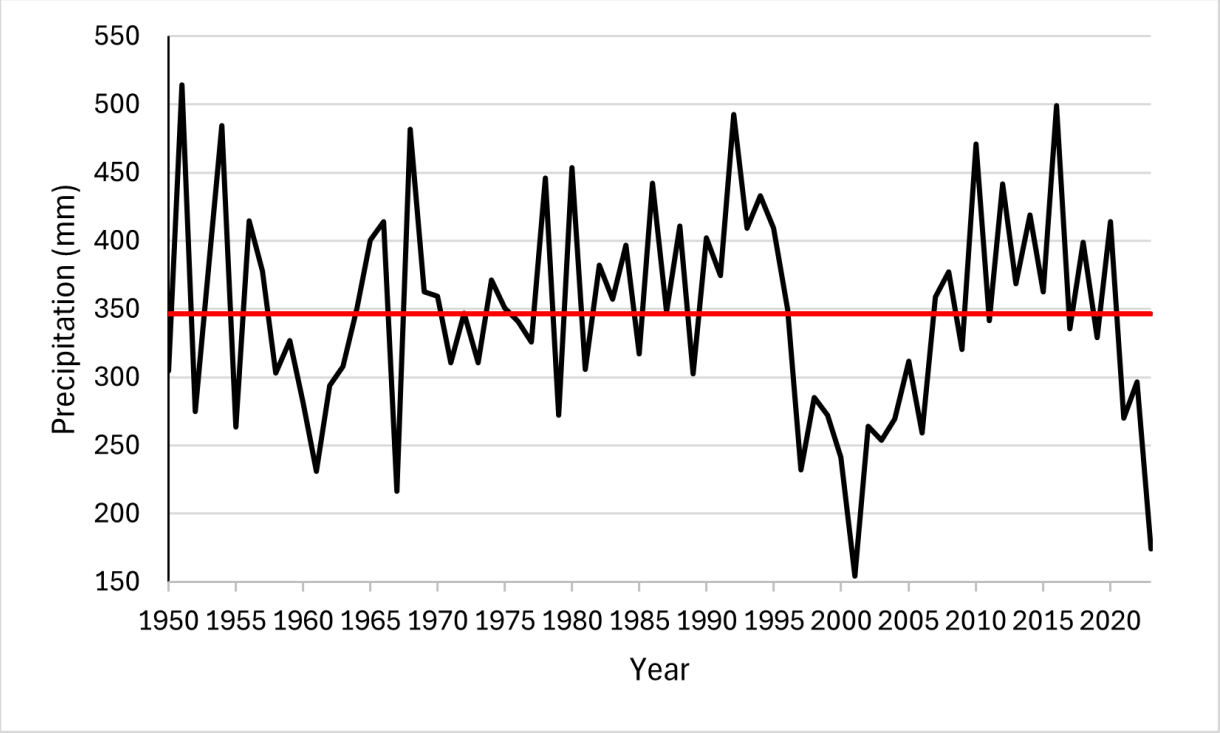
portion of the PSA; a few residential houses are visible along the eastern portion of the PSA (Appendix A – Figures A-3 to A-5).

The 2005 photograph depicts high water levels because of the 2005 flooding in Drumheller (Appendix A – Figure A-6). This flooding is apparent throughout the majority of the PSA; the riparian areas along the western portion of the PSA (R01 and R02), shrubby swamp W01 and the adjacent disturbed area, and shrubby swamp W02 are indistinguishable from surrounding vegetation along the PSA as they are all submerged. The Red Deer River water level extends throughout the floodplain, resulting in the southside of the riverbank being unidentifiable. It is still difficult to see EW01 and W03 as they are both located within a treed area, which is not fully submerged.

In the 2019 photograph, water levels are low and the shrubby riparian areas (R01 and R02) are visible along the western portion of the PSA (Appendix A – Figure A-7). Shrubby swamps W01 and W02 are visible in the northern portion of the PSA, more development is visible along the eastern portion of the PSA, and EW01 and W03 are still difficult to see as they are both located within a treed area. The anthropogenic disturbance adjacent to W01 is less obvious in this photo.

Climate analysis of local precipitation data for years corresponding with historical aerial photographs shows that below-average precipitation occurred in 1950 (304.58 mm), 1963 (307.83 mm), and 2005 (311.98 mm), compared with long-term average precipitation of 346.50 mm (Figure 2; GOA 2022; Table 1). Above-average precipitation occurred in 1982 (381.88 mm) and 1990 (402.39 mm) (GOA 2022; Table 1). Normal precipitation occurred in 1976 (341.10 mm) (Figure 2; GOA 2022; Table 1).

Figure 2: Annual and Average Precipitation from 1950 to 2023 for 28-19 W4M



Source: Government of Alberta (2022)

Table 1: Documentation of Historical Aerial Photographs and Satellite Imagery used to Classify Wet Areas within the Rosedale PSA

Photo Date (MM-DD-YYYY)	Photo ID (Roll AS# - Photo #)[a]	Resolution	Season[b]	Precipitation (mm)			Photo Notes
				Year[c]	Preceding Month Analysis[c]	Preceding Day Analysis[d]	
06-11-1950	0164-088	1:40,000	S	304.58 (D)	12.63 (D)	0.00 (0.00)	The majority of the vegetated portions of the PSA are shrubby. Fluvial sediment desposits can be seen at the bends in the channel and an exposed sandbar is visible along the eastern portion of the PSA. A residential area is located adjacent to the PSA.
05-19-1963	0874-195	1:31,680	S	307.83 (D)	10.47 (D)	0.00 (10.31)	The majority of the vegetated portions of the PSA are treed or shrubby. An area of open water, of anthropogenic origin, is located north of the PSA approximately 150 m from the Red Deer River. A residential area is located adjacent to the PSA.
08-11-1976	1485-298	1:31,680	Sum	341.10 (N)	40.05 (N)	0.00 (51.46)	The majority of the vegetated portions of the PSA are treed, with some shrubby areas. The anthropogenic open water is still visible north of the PSA. The residential area located adjacent to the PSA is extending into the northeastern portion of the PSA.
04-21-1982	AS 2449-110	1:25,000	S	381.88 (W)	16.99 (N)	0.00 (2.67)	The majority of the vegetated portions of the PSA are treed, with some shrubby areas. The anthropogenic open water located at edge of Red Deer River, north of the PSA, is still visible. The PSA is adjacent to a residential area.
06-22-1990	AS 4057-01	1:30,000	Sum	402.39 (W)	66.10 (W)	0.00 (39.12)	The majority of the vegetated portions of the PSA are densely treed, with some shrubby areas. The anthropogenic open water located at edge of Red Deer River, north of the PSA, is still visible. The PSA is adjacent to a residential area.

Table 1: Documentation of Historical Aerial Photographs and Satellite Imagery used to Classify Wet Areas within the Rosedale PSA

Photo Date (MM-DD-YYYY)	Photo ID (Roll AS# - Photo #)[a]	Resolution	Season[b]	Precipitation (mm)			Photo Notes
				Year[c]	Preceding Month Analysis[c]	Preceding Day Analysis[d]	
06-21-2005	AS 5335 - 225	1:10,000	Sum	311.98 (D)	128.51 (W)	0.00 (89.52)	Aerial photograph depicts flooding throughout the PSA, partially submerging the vegetated areas. The residential areas located immediately south of PSA are impacted by flooding. Vegetation boundaries are unclear in this photograph.
2019	Orthophoto	30 cm	S/Sum	329.26 (N)	n/a	n/a	The majority of the vegetated portions of the PSA are densely treed, with some shrubby areas. The anthropogenic open water located at edge of Red Deer River, north of the PSA, is less apparent in this photograph. The PSA is adjacent to a residential area.

Notes: ha = hectare; mm = millimetres; cm = centimetre; n/a = not applicable

a) Photo source from GOA (2016) unless otherwise stated.

b) S=Spring (April to June); Sum = Mid-Late Summer (June to September; Seasonality based on aerial photo and historical imagery capture date.

c) D=Dryer; N=Normal; W=Wetter. Long-term average annual precipitation: 346.50 mm (GOA 2022).

d) Total precipitation from the previous day (precipitation from the previous two weeks).

4.2 Terrestrial Survey

4.2.1 Wetlands and Riparian Areas

Field surveys were completed on May 11 and June 24, 2024 to survey vegetation communities and soil, confirm desktop mapping, and survey additional unmapped wetland areas observed in the field. Seven detailed vegetation plots were completed within the PSA in areas with visual evidence of wet features.

Field data (i.e., plant species, soil, and topography) indicated that the desktop mapped wet areas in the western portion of the PSA were shrubby riparian areas (R01 and R02) and the desktop mapped wet areas in the central portion of the PSA were temporary shrubby swamps (S-S [II]; W01 and W02) (Table 2; Figure 1). During the field visit, an ephemeral waterbody (EW01) and a seasonal graminoid marsh (M-G [III]; W03) were also documented (Table 2; Figure 1). Both of these were not visible in the desktop mapping completed for the PSA. Identification of some vegetation within the riparian and swamp areas were classified to species level because surveys were completed before flowers and other structures required for identification had developed.

Table 2: Information and Evidence Documented for Vegetation and Soils of Wetlands and Waterbodies within the Rosedale PSA

Plot ID	Wet Area ID	AWCS Classification / Vegetation Type	Organic Matter Type	Organic Matter Depth (cm)	A Horizon Texture	A Horizon Depth (cm)	B Horizon Texture	B Horizon Depth (cm)	Mottles Present (Yes/No)[(a)]	Comments
RVA008	W01	Temporary shrubby swamp (S-S [II])	LFH	2	Clay Loam	0	Very Fine Sandy Loam	8	Yes	Plot is located on the floodplain on the south bank of the Red Deer River. Distinct mottles present at 6 cm. Dominant vegetation species include sandbar willow (*Salix exigua*; 60%), common tansy (*Tanacetum vulgare*; 10%) and bluejoint (*Calamagrostis canadensis*; 10%).
RVA009	W01	Temporary shrubby swamp (S-S [II])	LFH	2	Silty Clay Loam	0	Silty Clay	12	Yes	Plot is located within a dense shrubby area. Distinct mottles are present at 3 cm and mottles are prominent below this depth. Dominant vegetation species include beaked willow (*Salix bebbiana*; 70%) and red-osier dogwood (*Cornus sericea*; 25%).
RVA012	W02	Temporary graminoid marsh (M-G [II])	LFH	2	Sandy Clay	0	Sandy Clay	9	Yes	Plot is located on the western side of the wetland. Distinct mottles are present at 3 cm depth. Dominant vegetation species include red-osier dogwood (15%) and small bottle sedge (*Carex utriculata*; 25%).
RVA015	W02	Temporary shrubby swamp (S-S [II])	LFH	3	Sandy Clay	0	Sandy Clay	8	Yes	Plot is located at in a central portion of the wetland. Distinct mottles are present at 4 cm depth. Dominant vegetation species include red-osier dogwood (50%), willow species (*Salix* sp.; 15%), and small bottle sedge (30%).
RVA018	W02	Temporary shrubby swamp (S-S [II])	LFH	0	Silty Clay Loam	0	Silty Clay Loam	7	Yes	Plot is located on the eastern portion of the wetland. Faint mottling is present beginning at 6 cm. Dominant vegetation species include red-osier dogwood (60%) and willows (30%), with some small bottle sedge (3%) present.
RWet01	EW01	Ephemeral waterbody	n/a	0	Clay Loam	30	n/a	0	No	Plot is located on the eastern side of the PSA. No mottles are present within the upper 30 cm. No wetland vegetation indicators are present. The wet area is located in a depression and appears to be ephemeral in nature.
RWet02	W03	Seasonal graminoid marsh (M-G [III])	LFH	3	Silty Clay	18	Silty Clay	9	Yes	Plot is located on the eastern side of the PSA. Distinct mottles are present at 5 cm and are abundant throughout. Dominant vegetation species include common horsetail (*Equisetum arvense*; 10%), reed canary grass (*Phalaris arundinacea*; 35%), awned sedge (*Carex atherodes*; 20%), and slough grass (*Beckmannia syzigachne*; 3%).

Notes: cm = centimetres; LFH = Litter, Fibric and Humic organic matter type; n/a = not applicable

a) Presence of mottles within upper 30 cm.

4.2.2 Wildlife

A wildlife sweep was conducted on May 10, 2024 by a qualified WSP biologist working in conjunction with the wetland and riparian assessment. The site was populated with poplar trees, Manitoba maple (*Acer negundo*), trembling aspen, white spruce (*Picea glauca*), red-osier dogwood, and willow species. There were numerous mature poplar trees that had potential for summer bat roosting, mammal dens, and roosting, nesting, and foraging for pileated woodpeckers.

Riparian areas R01 and R02 (Figure 1) bordered the Rosebud River to the west and residences along the top of the slope to the east. Small to medium Manitoba maple and willow trees were along the top of the slope. A stick nest was observed in a willow along the top of the bank and was inactive at the time of the survey (12U 332971 E; 5582207 N). Riprap along the top of the bank with west exposure was observed that held potential for snake hibernacula (12 U 386797 E; 5697697 N). There was no evidence of reptile use during the time of the survey. A den was observed in the forested area north of Railway Avenue (12 U 387212E; 5697932 N). The den was approximately 50 cm wide and appeared to be 1 to 2 m in depth and was deemed inactive at the time of the survey. A moose (*Alces alces*) was observed walking through the forest in the same area of the inactive den. Two inactive nest cavities were observed during the survey; one was located in the forest north of Railway Avenue (12 U 387360 E; 5697888 N) and the other was located in the forest on the east side of the Project footprint southeast of Starmine Drive (12U 386797 E; 5697697 N). An ephemeral waterbody was observed in the forest east of Pinter Drive (12U 387904 E; 5697320 N), which can serve as potential amphibian breeding habitat. However, no amphibians or breeding activity were observed at the time of the survey.

5.0 SUMMARY

Surveys were conducted to identify wetlands and riparian areas within the PSA. Based on the field verification of the aerial photograph and satellite imagery review, the wet areas along the western portion of the Project are shrubby riparian areas and the wet areas in the central portion of the Project are shrubby swamps (Figure 1). An ephemeral waterbody and a seasonal graminoid marsh were also identified in the field during the terrestrial assessment. Riparian areas generally function as upland areas; moisture levels can vary between years due to events such as drought or flooding, but the ground does not stay saturated with water long enough to promote water altered soils or the growth of water tolerant vegetation that is indicative of wet environments. Ephemeral waterbodies and wetlands both have water altered soils and/or water tolerant vegetation species.

A terrestrial wildlife sweep was performed to assess the PSA and 100 m buffer for the presence of important wildlife features, including occupied nests or dens and mineral licks. Habitat noted during the wildlife sweep conducted on May 10, 2024, indicated that habitat within the PSA is consistent with suitable nesting habitat for migratory birds, woodpeckers, bats, and raptors. Furthermore, important wildlife features within the PSA were documented. These features included stick nests, dens and nest cavities. All of these features were inactive at the time of the sweep.

6.0 RECOMMENDATIONS

Following this survey, the berm footprint was adjusted to avoid and minimize wetland impacts to the extent possible. The berm footprint was adjusted to avoid the riparian area R02, the northern portion of wetland W01, and all of wetland W02. Disturbance to riparian areas do not require a Wetland Assessment and Impact Report (WAIR). However, for any disturbance to ephemeral waterbodies (i.e., EW01), a submission of a Code of Practice Notification is required, and for any permanent disturbance to wetlands (i.e., W01 and W03), a *Water Act*

application (and associated WAIR) is required under the Alberta Wetland Policy. Therefore, a Code of Practice Notification and a *Water Act* application will be required for the proposed Rosedale Berm.

To comply with the *Alberta Wildlife Act* and *Migratory Birds Convention Act* (MBCA), prior to any Project activities, including the clearing of vegetation, if activities occur between March 15 and August 2515 WSP provides the following recommendations based on the criteria that the contractor must be aware of other potential wildlife issues or conflicts within the PSA. The contractor is responsible for following all federal and provincial policies and Acts in dealing with encounters and/or impacts to wildlife that may occur during Project activities including:

- A pre-disturbance wildlife sweep, must be completed prior to any Project activities, including the clearing of any vegetation on non-public lands, during the sensitive nesting and breeding period from March 15 to August 15 or on public lands at any time during the year (GOA 2021a). If construction does not proceed within the same growing season as the completed wildlife sweep and proceeds in (i.e., construction occurs in spring 2025 or later), the current wildlife sweep will expire and a new wildlife sweep will be required to ensure adequate identification of any new wildlife features within the PSA and 100 m buffer search.
- Construction activities should occur outside the nesting season for the B4 Nesting Zone which has a nesting period of April 20 to August 25 (GoC 2024). Construction activities should occur outside the migratory bird nesting season. If any Project activities, including vegetation removal are required during this period, a qualified wildlife biologist must conduct a nest sweep of the disturbance area, as part of the pre-disturbance wildlife sweep. If active nests are found, the qualified biologist will provide written mitigation and protection measures (e.g., setbacks and/or timing restrictions) to minimize effects to migratory birds.

Additional wildlife and wildlife feature mitigations may be required if wildlife or wildlife features are observed during construction. All wildlife observations made during construction should be reported to a qualified biologist. The biologist will recommend mitigations depending on the species, as needed.

7.0 CLOSURE

This report was prepared by WSP for Drumheller. The material in this report reflects WSP's best judgment considering information available to it at the time of preparation. If Drumheller edits, revises, alters, or adds to the material in this report in any way, all reference to WSP and WSP's employees must be removed unless Drumheller's changes are agreed to by WSP. Any use which a third party makes of this report or any reliance on or decisions to be made based on it, are the responsibility of such third party. WSP accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or action based on this report.

We trust the information contained in this report is sufficient for your present needs. Should you have any questions regarding the project, please do not hesitate to contact the signatories below.

WSP CANADA INC.

Julie Benedik, M.Sc., P.Biol
Experienced, Vegetation Ecologist

Marcie Plishka, M.Sc.
Lead, Vegetation Ecologist

JB/MP/pls

https://wsponlinecan.sharepoint.com/sites/ca-ca00115718462/shared documents/05. technical/rosedale trees & rosedale_nacmine wetlands & michichi veg_wetlands/reporting/rosedale wetland & wildlife memo/rosedale_flood mitigation_wetland wildlife_memo_2024_rev1.docx

8.0 REFERENCES

AEP (Alberta Environment and Parks). 2018. Alberta Merged Wetland Inventory. Publication Date: October 22, 2018. Government of Alberta, Edmonton, AB. [accessed May 2024]. Available at: http://geodiscover.alberta.ca/geoportal/#searchPanel.

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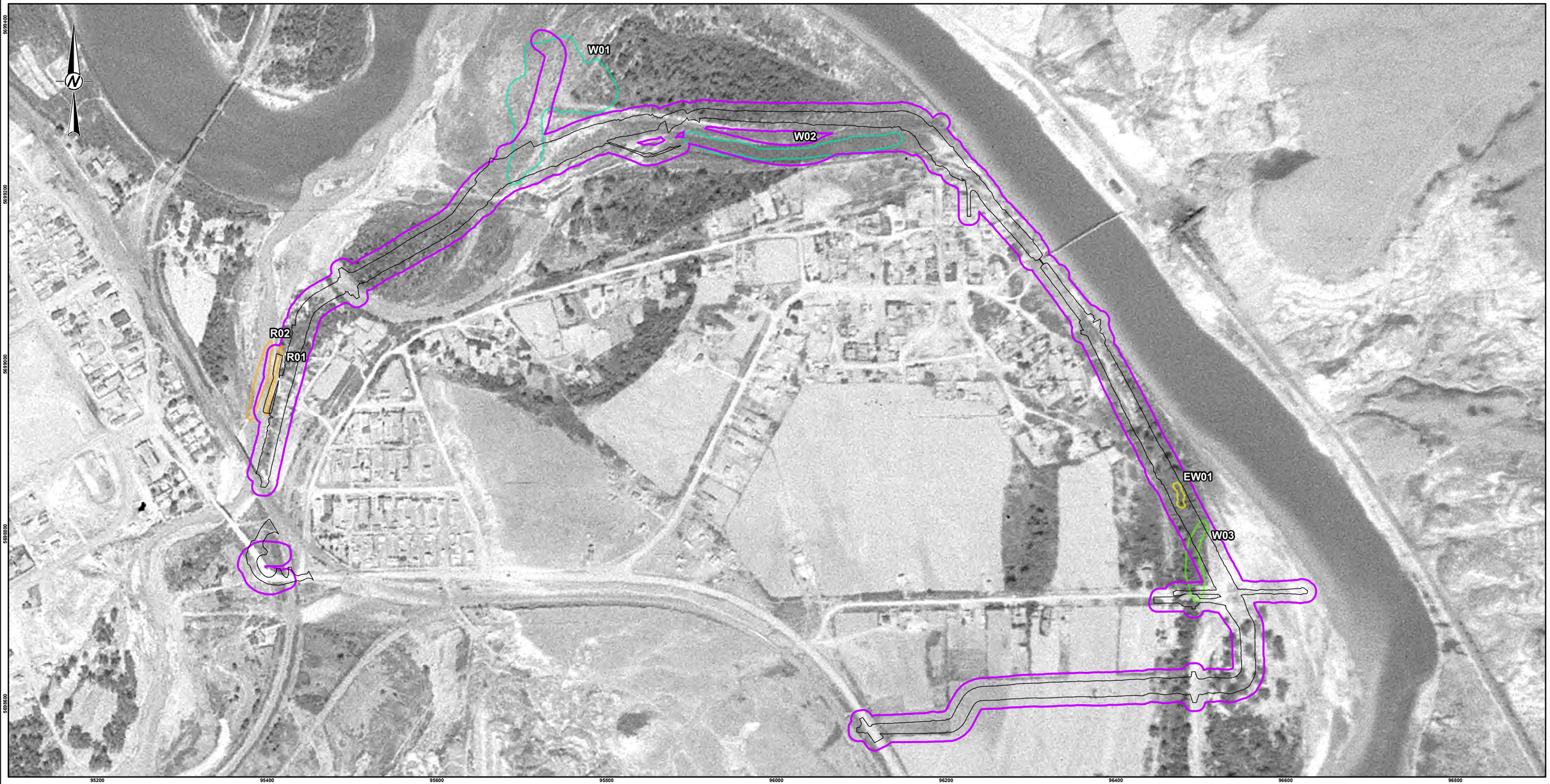
APPENDIX A

Historical Aerial Photographs



LEGEND

- PROJECT STUDY AREA (10 M OF PRELIMINARY BERM FOOTPRINT)
- PROJECT FOOTPRINT

CURRENT WETLAND, WATERBODY, AND RIPARIAN BOUNDARY

- SEASONAL GRAMINOID MARSH
- TEMPORARY SHRUBBY SWAMP
- EPHEMERAL WATERBODY
- RIPARIAN - SHRUBBY

0 100 200

1:4,500 METRES

REFERENCE(S)

1. FIELD WORK DATE: MAY 10 AND 11, 2024.
2. HISTORIC IMAGERY PROVIDED BY THE AIR PHOTO LIBRARY, GOVERNMENT OF ALBERTA, PHOTO CAPTURED JUNE 11, 1950.

SPATIAL REFERENCE: CANA83-3TM114

CLIENT

DRUMHELLER VALLEY

CONSULTANT

wsp

YYYY-MM-DD	2024-09-11
DESIGNED	MP
PREPARED	HB
REVIEWED	JB
APPROVED	JB

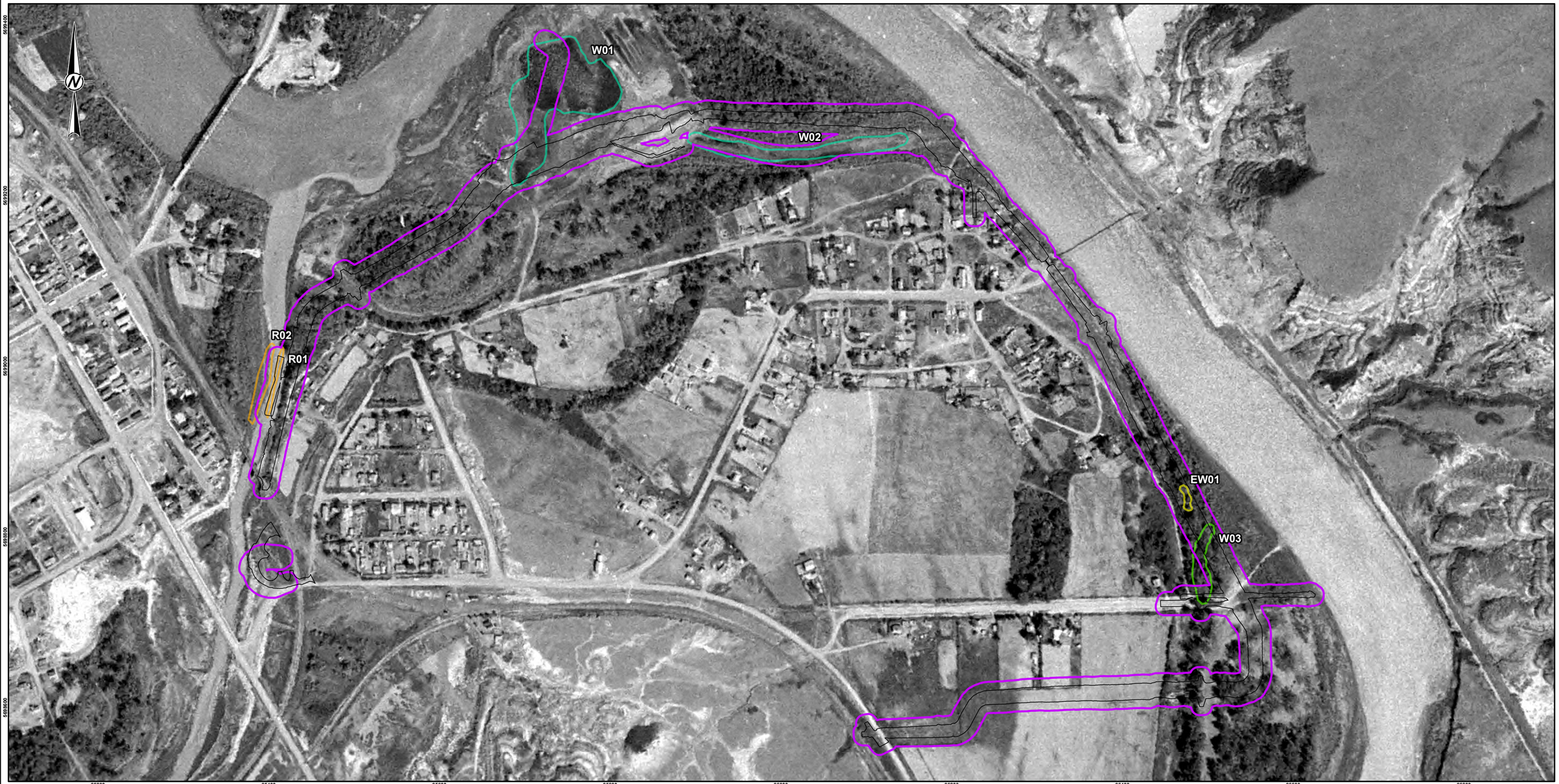
PROJECT

DRUMHELLER RESILIENCY AND FLOOD MITIGATION PROJECT
TERRESTRIAL ASSESSMENT OF ROSEDALE

TITLE

HISTORIC AIR PHOTO - 1950

PROJECT NO.	CONTROL	REV.	FIGURE
CA0011571.8462		1	A-1



LEGEND

- PROJECT STUDY AREA (10 M OF PRELIMINARY BERM FOOTPRINT)
- PROJECT FOOTPRINT

CURRENT WETLAND, WATERBODY, AND RIPARIAN BOUNDARY

- SEASONAL GRAMINOID MARSH
- TEMPORARY SHRUBBY SWAMP
- EPHEMERAL WATERBODY
- RIPARIAN - SHRUBBY

0 100 200

1:4,500 METRES

REFERENCE(S)

1. FIELD WORK DATE: MAY 10 AND 11, 2024.
2. HISTORIC IMAGERY PROVIDED BY THE AIR PHOTO LIBRARY, GOVERNMENT OF ALBERTA, PHOTO CAPTURED MAY 1963.
SPATIAL REFERENCE: CANA83-3TM114

CLIENT

DRUMHELLER VALLEY

CONSULTANT

wsp

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DESIGNED	MP
PREPARED	HB
REVIEWED	JB
APPROVED	JB

PROJECT

DRUMHELLER RESILIENCY AND FLOOD MITIGATION PROJECT
TERRESTRIAL ASSESSMENT OF ROSEDALE

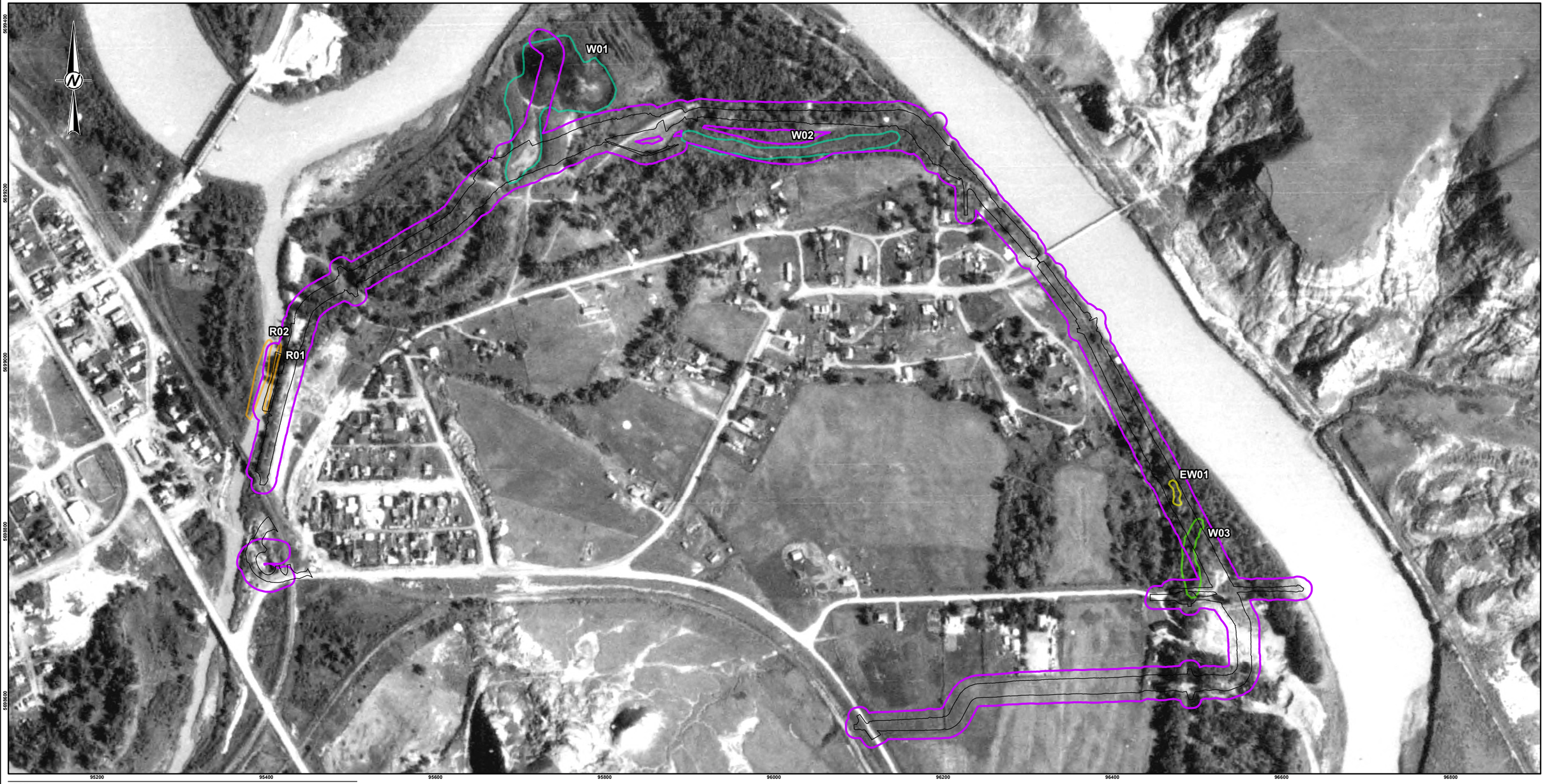
TITLE

HISTORIC AIR PHOTO - 1963

PROJECT NO.	CONTROL	REV.	FIGURE
CA0011571.8462		1	A-2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

PATH: I:\CLIENTS\TOWN_OF_DRUMHELLER\CA0011571_8462\Mapping\02_VEGETATION\CA0011571_8462_ROSEDALE_FIG_A0_HISTORICS.aprx PRINTED ON: AT 4:10:41 PM



LEGEND

- PROJECT STUDY AREA (10 M OF PRELIMINARY BERM FOOTPRINT)
- PROJECT FOOTPRINT

CURRENT WETLAND, WATERBODY, AND RIPARIAN BOUNDARY

- SEASONAL GRAMINOID MARSH
- TEMPORARY SHRUBBY SWAMP
- EPHEMERAL WATERBODY
- RIPARIAN - SHRUBBY

0 100 200
1:4,500 METRES

REFERENCE(S)
1. FIELD WORK DATE: MAY 10 AND 11, 2024.
2. HISTORIC IMAGERY PROVIDED BY THE AIR PHOTO LIBRARY, GOVERNMENT OF ALBERTA, PHOTO CAPTURED AUG 11, 1976.
SPATIAL REFERENCE: CANA83-3TM114

CLIENT
DRUMHELLER VALLEY

CONSULTANT
wsp

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DESIGNED	MP
PREPARED	HB
REVIEWED	JB
APPROVED	JB

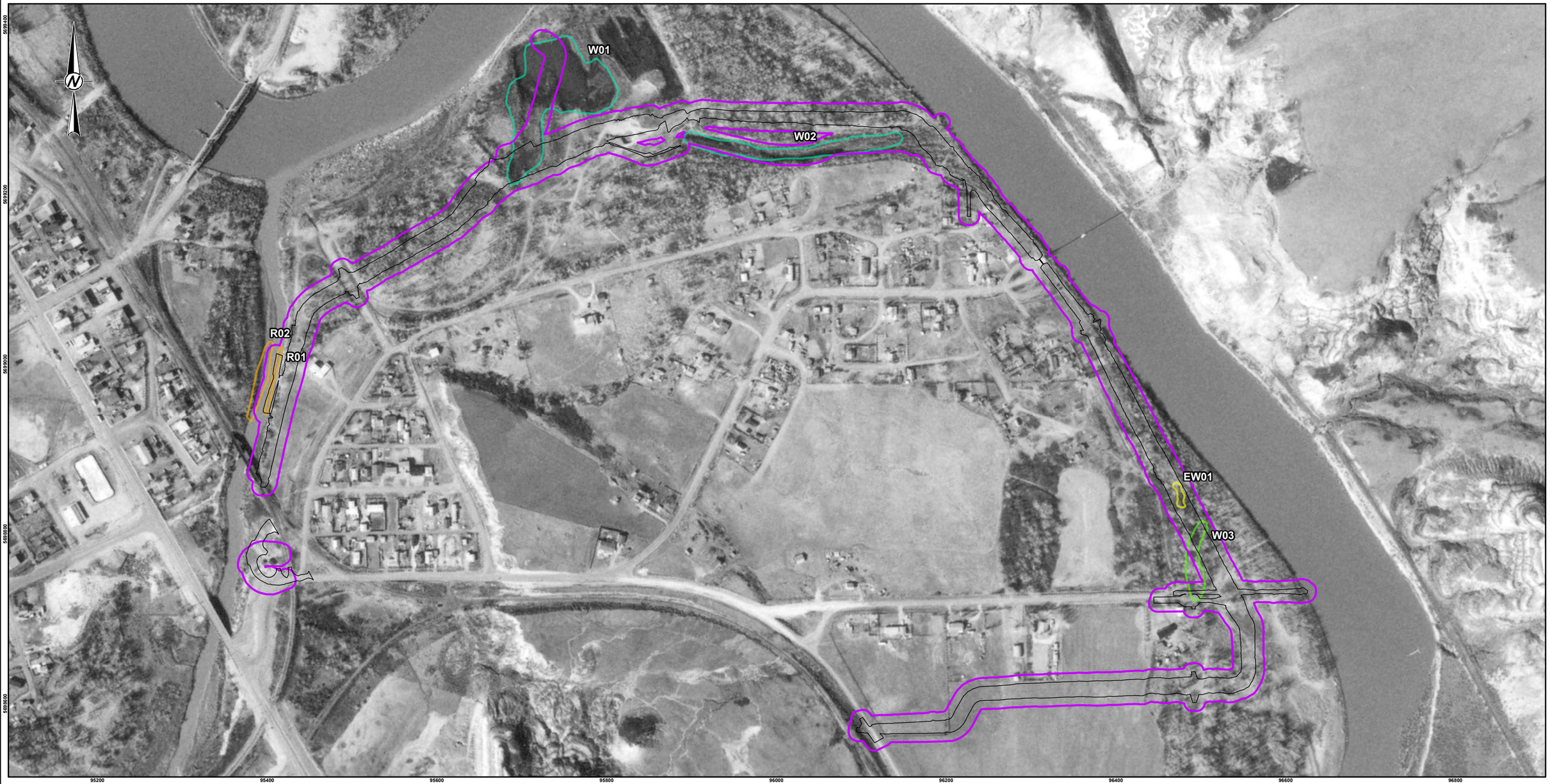
PROJECT
DRUMHELLER RESILIENCY AND FLOOD MITIGATION PROJECT
TERRESTRIAL ASSESSMENT OF ROSEDALE

TITLE
HISTORIC AIR PHOTO - 1976

PROJECT NO.	CONTROL	REV.	FIGURE
CA0011571.8462		1	A-3

1 in IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

PATH: I:\CLIENTS\TOWN_OF_DRUMHELLER\CA0011571.8462\Mapping\02_VEGETATION\CA0011571_8462_ROSEDALE_FIG_A0_HISTORICS.aprx PRINTED ON: AT 4:11:55 PM



LEGEND

- PROJECT STUDY AREA (10 M OF PRELIMINARY BERM FOOTPRINT)
- PROJECT FOOTPRINT

CURRENT WETLAND, WATERBODY, AND RIPARIAN BOUNDARY

- SEASONAL GRAMINOID MARSH
- TEMPORARY SHRUBBY SWAMP
- EPHEMERAL WATERBODY
- RIPARIAN - SHRUBBY

0 100 200
1:4,500 METRES

REFERENCE(S)
1. FIELD WORK DATE: MAY 10 AND 11, 2024.
2. HISTORIC IMAGERY PROVIDED BY THE AIR PHOTO LIBRARY, GOVERNMENT OF ALBERTA, PHOTO CAPTURED APRIL 21, 1982.
SPATIAL REFERENCE: CANA83-3TM114

CLIENT
DRUMHELLER VALLEY

CONSULTANT
wsp

YYYY-MM-DD	2024-09-11
DESIGNED	MP
PREPARED	HB
REVIEWED	JB
APPROVED	JB

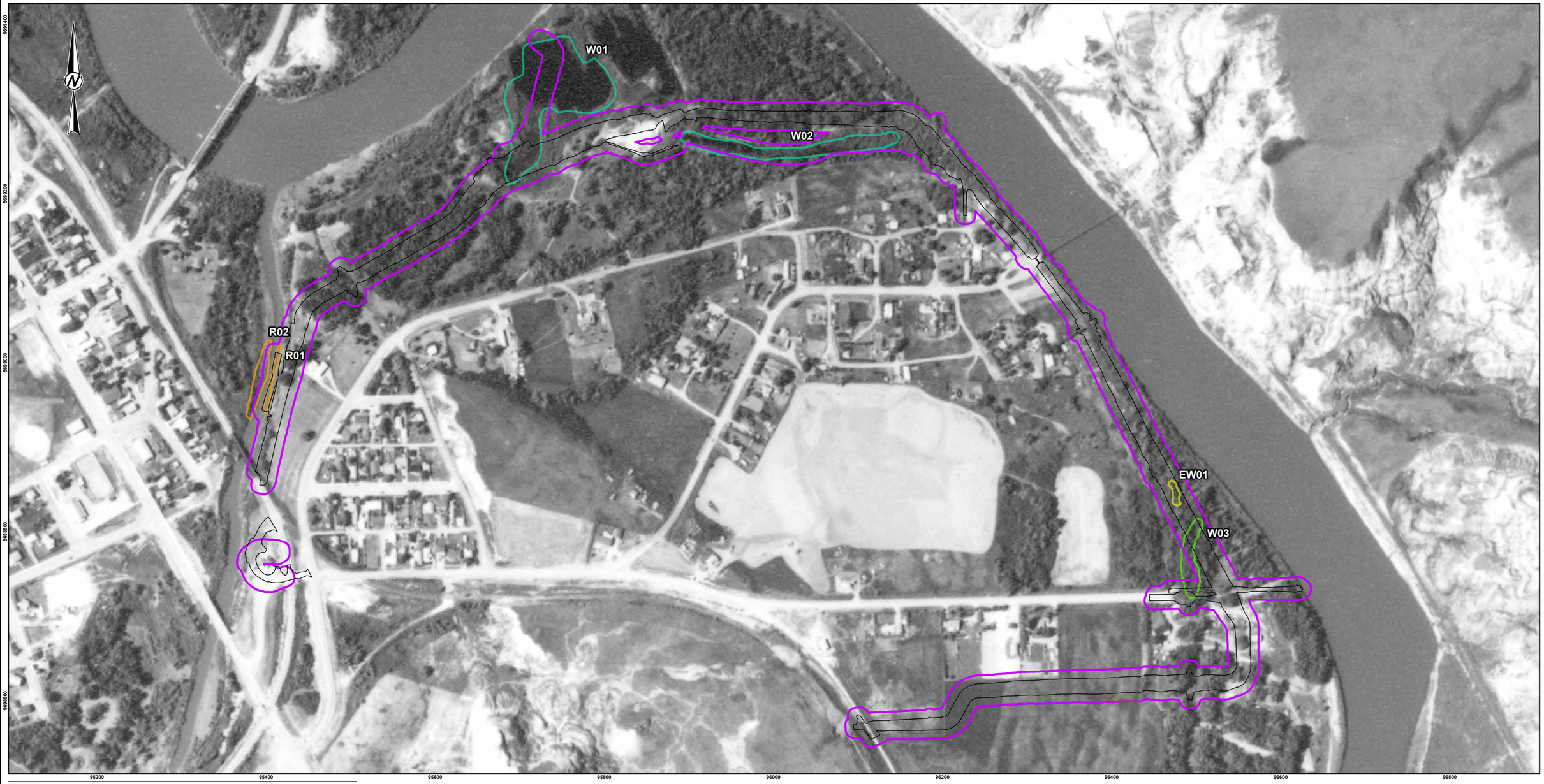
PROJECT
DRUMHELLER RESILIENCY AND FLOOD MITIGATION PROJECT
TERRESTRIAL ASSESSMENT OF ROSEDALE

TITLE
HISTORIC AIR PHOTO - 1982

PROJECT NO.	CONTROL	REV.	FIGURE
CA0011571.8462		1	A-4

PATH: I:\CLIENTS\TOWN_OF_DRUMHELLER\CA0011571_8462\Mapping\02_VEGETATION\CA0011571_8462_ROSEDALE_FIG_A0_HISTORICS.aprx PRINTED ON: AT: 4:12:46 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
1 in
0



LEGEND

- PROJECT STUDY AREA (10 M OF PRELIMINARY BERM FOOTPRINT)
- PROJECT FOOTPRINT

CURRENT WETLAND, WATERBODY, AND RIPARIAN BOUNDARY

- SEASONAL GRAMINOID MARSH
- TEMPORARY SHRUBBY SWAMP
- EPHEMERAL WATERBODY
- RIPARIAN - SHRUBBY

0 100 200

1:4,500 METRES

REFERENCE(S)
1. FIELD WORK DATE: MAY 10 AND 11, 2024.
2. HISTORIC IMAGERY PROVIDED BY THE AIR PHOTO LIBRARY, GOVERNMENT OF ALBERTA, PHOTO CAPTURED JUNE 22, 1990.
SPATIAL REFERENCE: CANA83-3TM114

CLIENT
DRUMHELLER VALLEY

CONSULTANT
wsp

YYYY-MM-DD	2024-09-11
DESIGNED	MP
PREPARED	HB
REVIEWED	JB
APPROVED	JB

PROJECT
DRUMHELLER RESILIENCY AND FLOOD MITIGATION PROJECT
TERRESTRIAL ASSESSMENT OF ROSEDALE

TITLE
HISTORIC AIR PHOTO - 1990

PROJECT NO.	CONTROL	REV.	FIGURE
CA0011571.8462		1	A-5

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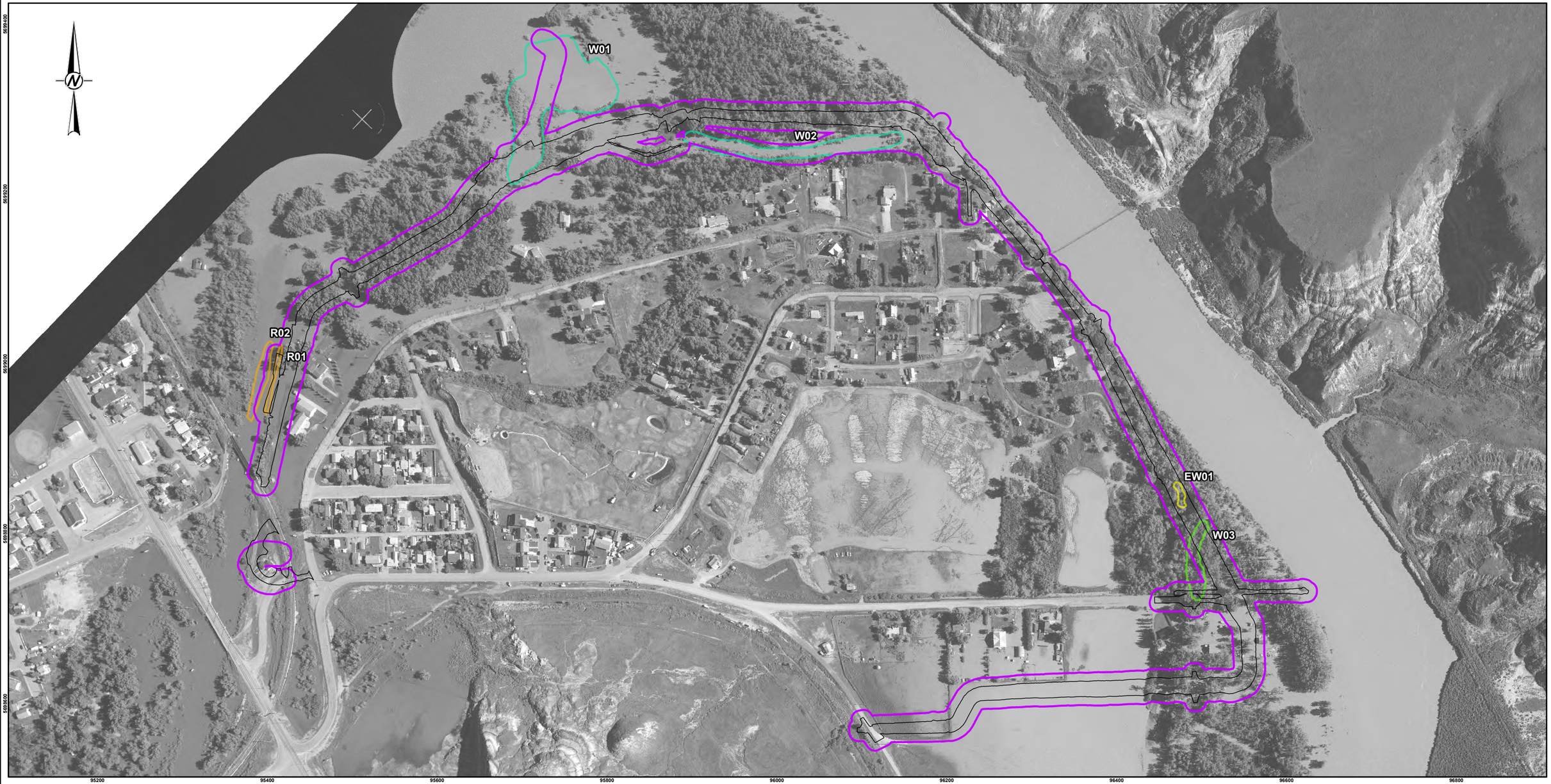
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

- PROJECT STUDY AREA (10 M OF PRELIMINARY BERM FOOTPRINT)
- PROJECT FOOTPRINT

CURRENT WETLAND, WATERBODY, AND RIPARIAN BOUNDARY

- SEASONAL GRAMINOID MARSH
- TEMPORARY SHRUBBY SWAMP
- EPHEMERAL WATERBODY
- RIPARIAN - SHRUBBY

0 100 200

1:4,500 METRES

REFERENCE(S)

1. FIELD WORK DATE: MAY 10 AND 11, 2024.
2. HISTORIC IMAGERY PROVIDED BY THE AIR PHOTO LIBRARY, GOVERNMENT OF ALBERTA, PHOTO CAPTURED JUNE 21, 2005.

SPATIAL REFERENCE: CANA83-3TM114

CLIENT: DRUMHELLER VALLEY

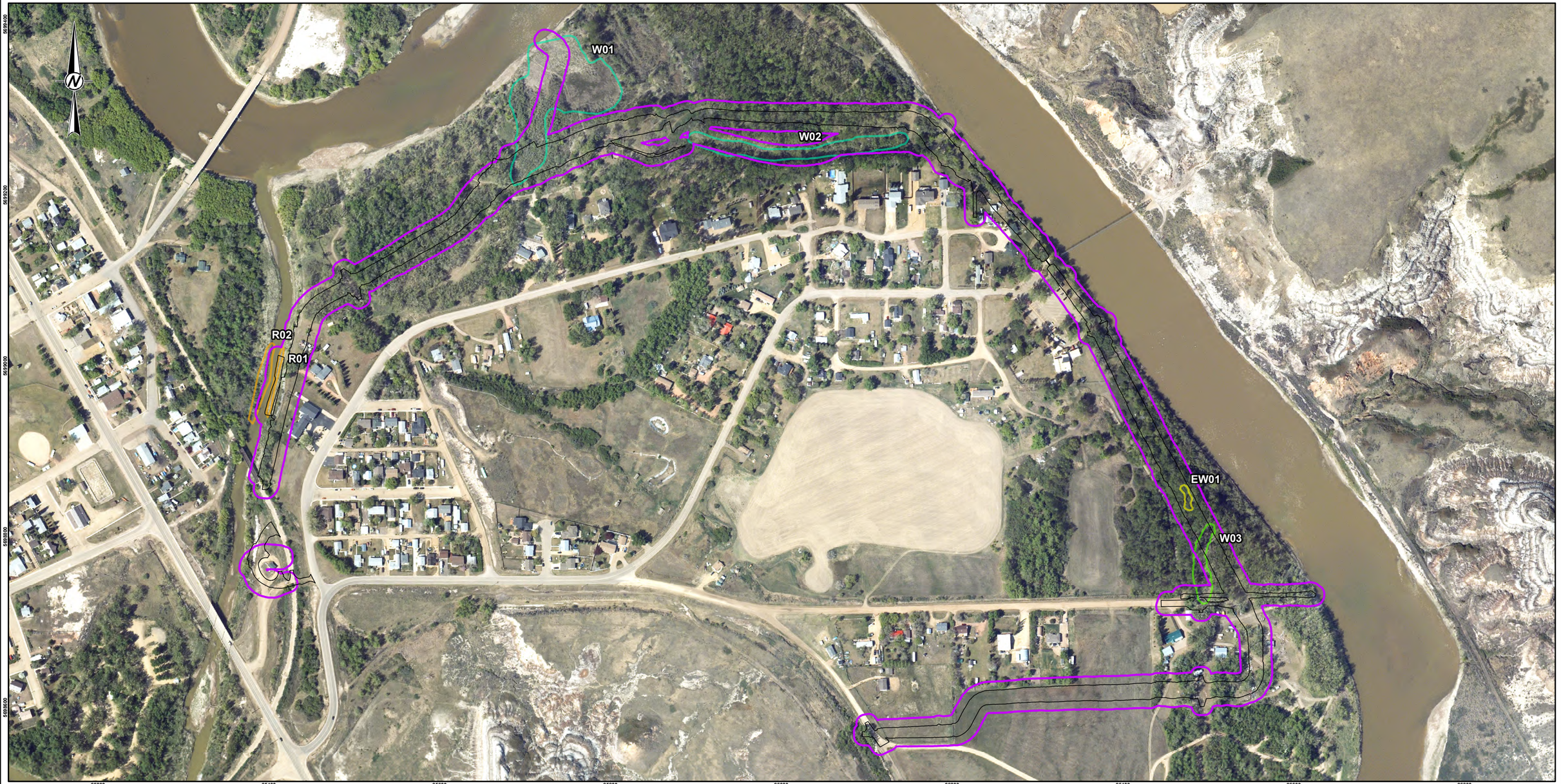
CONSULTANT: wsp

YYYY-MM-DD	2024-09-11
DESIGNED	MP
PREPARED	HB
REVIEWED	JB
APPROVED	JB

PROJECT: DRUMHELLER RESILIENCY AND FLOOD MITIGATION PROJECT TERRESTRIAL ASSESSMENT OF ROSEDALE

TITLE: **HISTORIC AIR PHOTO - 2005**

PROJECT NO.	CONTROL	REV.	FIGURE
CA0011571.8462		1	A-6



LEGEND

- PROJECT STUDY AREA (10 M OF PRELIMINARY BERM FOOTPRINT)
- PROJECT FOOTPRINT

CURRENT WETLAND, WATERBODY, AND RIPARIAN BOUNDARY

- SEASONAL GRAMINOID MARSH
- TEMPORARY SHRUBBY SWAMP
- EPHEMERAL WATERBODY
- RIPARIAN - SHRUBBY

0 100 200

1:4,500 METRES

REFERENCE(S)

1. FIELD WORK DATE: MAY 10 AND 11, 2024.
2. HIGH RESOLUTION AERIAL PHOTO FROM 2019 AND PROVIDED BY DRFMO.
SPATIAL REFERENCE: CANA83-3TM114

CLIENT

DRUMHELLER VALLEY

CONSULTANT

wsp

YYYY-MM-DD	2024-09-11
DESIGNED	MP
PREPARED	HB
REVIEWED	JB
APPROVED	JB

PROJECT

DRUMHELLER RESILIENCY AND FLOOD MITIGATION PROJECT
TERRESTRIAL ASSESSMENT OF ROSEDALE

TITLE

HISTORIC AIR PHOTO - 2019

PROJECT NO.	CONTROL	REV.	FIGURE
CA0011571.8462		1	A-7