Appendix H

Waterfowl Adaptive Mitigation Plan

Memo

To:	Patrick Winter, P.Eng., Project Manager, City of Windsor
From:	Caitlin Vandermeer, Dillon Consulting Limited
	Laura Herlehy, P.Eng., Dillon Consulting Limited
cc:	Phil Roberts
Date:	May 17, 2023
Subject:	Supplementary Waterfowl Adaptive Mitigation Plan for Stormwater Management Facilities Sandwich South Master Planning Area
Our File:	19-9817

The purpose of this document is to supplement the functional design of the stormwater management facilities proposed to service the Sandwich South Master Planning Area, as well as the proposed Natural Environment system is required to protect, preserve and, where appropriate, enhance the natural environment. This document should be reviewed in conjunction with the Sandwich South Master Servicing Plan report which provides additional context on the overall serving strategy for the Sandwich South (SS) Area.

Necessary due diligence and engineering shall be completed to ensure that the designs meet Transport Canada's requirements, the airport has been consulted through the design process and that the ponds do not pose additional safety risk associated with bird hazards. This plan focuses on risks associated with stormwater management facilities and does not address waterfowl mitigation required for other land uses such as park lands or for other open areas.

1.0 Introduction

Dillon Consulting Limited (Dillon) was retained by the City of Windsor (City) to complete a Master Servicing Plan for the Sandwich South (SS) area which will provide a framework for future infrastructure required to meet the growing needs of the community. The Sandwich South Master Servicing Plan (SSMSP) is building upon the stormwater management (SWM) recommendations that were developed through the Upper Little River Watershed and Master Drainage and Stormwater Management Plan Environmental Assessment (ULRMP) plan, 2023. As a result of the ULRMP, several linear stormwater management facilities are proposed within the SS area to support residential, institutional, industrial and commercial development. The SWM facilities were proposed to be regional wet ponds that provide both quality and quantity control of runoff to meet the design criteria outlined in the Windsor/Essex Region Stormwater Management Standards Manual (2018) as well as to attenuate flows to acceptable release rates determined in the ULRMP.

Through the SSMSP, refinement to the SWM strategy has resulted in the recommendation to propose a hybrid approach where dry ponds are proposed in areas that are within the identified Windsor International Airport's Primary Hazard Zone.

It is understood that SWM ponds, especially those that have permanent standing water pools have the potential to attract waterfowl and are identified as a hazardous when in the vicinity of airports per Transportation Canada Aviation guidelines such as the Canadian Aviation Regulations (CARs). See Section 2 below for additional context on regulatory requirements. Windsor International Airport (noted herein as "WIA") is located within the SS study area and therefore precautionary and active management of waterfowl is required to mitigate risks of collisions that pose hazard to human health and safety. WIA is 813 hectares (ha) and is located, north of County Road 42, east of the existing Canadian National Railway's Pelton Spur line, south of Rhodes Drive and west of Lauzon Parkway.

Currently, WIA conducts regular monitoring within and adjacent to the airport lands to meet the CAR requirements and to facilitate safe operation of the airport. The introduction of SWM facilities to the area will require additional monitoring and continued management throughout the lifetime of these facilities. It is necessary to consider the long-term operational needs of the ponds as it relates to waterfowl mitigation and is discussed in more detail in this document.

The purpose of this memo is to provide a framework for mitigation, monitoring, and adaptive management for the long-term use of SWM ponds proposed to service the SS area. The proposed monitoring outlined herein is intended to build upon monitoring and mitigation currently being applied by the WIA.

1.1 Existing Conditions

The SS area is approximately 25.4 km^2 (2,540 ha) in size and sits within the Little River watershed along the southeastern region of the City of Windsor. The area is considered the largest portion of undeveloped land within the City boundary, bound by Highway 401 to the south, Walker Road and the Canadian National (CN) Rail to the West, the Town of Tecumseh municipal boundary to the east and the EC Row Expressway to the North (the Study Area; Attachment A - Figure 1).

The Study Area is currently dominated by agricultural lands with scattered residential homes. Natural heritage features (woodlands, watercourses, fish habitat, wetlands, etc.) are limited, however, tend to be localized to the Little River watercourse. In addition, several municipal drains exist within agricultural fields and along existing roadways which conveys runoff from the watershed downstream to the Little River drain and eventually to Lake St. Clair. It is not the purpose of the drains to provide quality control and they do not contain standing water for long periods of time. While there are Provincially Significant Wetlands (PSW) swamp communities present directly within WIA lands, there are limited aquatic habitats present within the SS area that would attract waterfowl or other wildlife to WIA. Although minimal natural habitat is present, it is noted that two wet SWM ponds are present within the broader landscape outside of the Study Area to the north (Central Avenue) and west (Captain John Wilson), respectively (Attachment A – Figure 1); the WIA monitors these ponds as part of their monthly risk assessment activities to manage waterfowl hazards.

1.2 Proposed Conditions

As mentioned previously, to facilitate the proposed land use for the SSMSP area, several open water SWM ponds are proposed to occur along the existing municipal drains including Little River watercourse, 6th Concession Drain and the proposed 7th Concession drain re-alignment (Attachment A – Figure 1). In addition to the construction of the linear SWM ponds, the adjacent drains are also proposed to be modified to be suitable for the future urbanization of this area. The side slopes and depths of the municipal drains were set to allow sufficient capacity to provide conveyance of drainage under interim and proposed conditions. The proposed SWM plan is detailed in the SSMSP Stormwater Management Report (Appendix D) being completed for the SSMSP. Public safety has also been considered as the proposed SWM ponds will be recreational corridors that will have active transportation linkages and natural environment areas. While the widening of drains may increase the observable surface area of water within drains, it is anticipated that flow within the drains will be temporary for the purposes of drainage of lands after rain events and not to contain permanent standing water.

The proposed SWM ponds are to be constructed on the landscape via a phased approach to follow the construction of developable areas based on the established land use plan found in the related Secondary Plans. It is anticipated that the SWM ponds located, south of Baseline Road, within the East Pelton Secondary Plan area (P1), and adjacent to Lauzon Parkway, north of CR42 (P7 and P8) will be required first (Attachment A – Figure 1). The remaining SWM ponds will be added to the landscape as development continues within the East Pelton and Country Road 42 Secondary Plan Areas. The SWM Ponds outside of the two secondary plan areas will be constructed in the future as development areas expand and the necessary planning studies have been completed to support that development. Exact timing of pond construction is not known and it is anticipated that the full build out of the area will take more than 20 years.

Both wet and dry SWM ponds have the potential to attract waterfowl, therefore, recommendations included in this report apply to both types of facilities.

2.0 Aviation Perspective

Transport Canada regulates airports and aerodromes through legislated regulations (Canadian Aviation Regulations (CAR's)) and policy, standards and practices (TP) manuals. Wildlife control and mitigation is one of many legislated considerations in the operation of an airport. CAR's Part III – Aerodromes, Airports and Heliports, Division III – Airport Wildlife Planning and Management, Section 302.304(1) Risk Analysis (Attachment A), outlines the Airport Operators obligations to undertake a risk assessment of hazards presented by wildlife and wildlife attractions.

Stormwater retention ponds are known wildlife attractants. Transport Canada's TP1247E – Land Use in the Vicinity of Aerodromes, Part III – Bird Hazards and Wildlife, Section 3.2 - Hazardous Land-use Acceptability, Table 1 – Hazardous Land-use Acceptability by Hazard Zone (Attachment B), identifies SWM ponds as being a potentially low level of risk in secondary and special hazard zones but not a land use for primary hazard zones.

Portions of the proposed SWM facilities fall within the primary hazard zone of the Windsor Airport. That zone being defined in TP1247E as, generally enclosed airspace in which aircraft are at or below altitudes of 1500 feet AGL (457 meters above ground level). These are the altitudes most populated by hazardous birds, and at which collisions with birds have the potential to result in the greatest damage.

Of the WIA runways, the proposed SWM features are in closest proximity to Runway 12-30/RWY 30 approach, which has a northwest/southeast alignment. RWY 30 is Windsor's primary runway for passenger carriers operating turbo prop, regional and corporate jet aircraft as well as recreational and training aircraft use. The approach surface for RWY 30, as protected by the Airport Registered Zoning (AZR), is a 50:1 surface extending 10,000 feet from the pavement threshold. This is the second most used approach at Windsor Airport and aircraft using this approach could legally be less than 200 feet AGL (Above Ground Level) crossing over some of the proposed SWM features. Circuits for landing RWY 12 or 30 are all below 1000 feet AGL. Refer to Attachment A - Figure 3, which illustrates these boundaries.

Stormwater features in our region are known to attract waterfowl, herons and gulls. Species of principal interest due to their abundance, behaviour and size are Canada Goose (Branta canadensis maxima), Mallard Duck (Anas platyrhynchos), Great Blue Heron (Ardea herodias) and Ring-billed Gull (Larus delawarensis). These species rank high in wildlife hazard risk from North American birdstrike databases, TP11500 – Wildlife Control Procedures Manual and the Windsor Airport Wildlife Control Plan risk assessment database (Attachment D – Species Hazard Ranking).

These species rely on access to open water for both feeding and safety and often are in close proximity for breeding and fledging young. These species are grazers with gulls and herons being "grubbers", eating a variety of turf, soil and aquatic insects, invertebrates and small vertebrates. These species for the most part prefer open wetland and grassland habitats are not adept to swamp wetlands or course habitat features.

3.0 Waterfowl Adaptive Mitigation Plan

The waterfowl adaptive mitigation plan was developed to follow guidelines provided in the 2018 *Template for the Development of an Airport Wildlife Management Plan* by Transport Canada and considered risk assessment parameters currently in use by the WIA. Additional documents, current research, government protocols, and best management practices, used for the development of this plan are listed below:

- Land Use in the Vicinity of Aerodromes, Ninth Edition, Transport Canada (2013);
- Wildlife Control Procedures Manual. Transport Canada Aerodromes Standards Branch (2015);
- Landscape Design Guidelines for Stormwater Facilities. City of Hamilton (May 2009);
- Wildlife Hazard Mitigation, Federal Aviation Administration, United States Department of Transportation (August, 2020);
- Airport Wildlife Management. Bulletin No. 38. Transport Canada (2007);
- 2005 Sustainability Report for Toronto Pearson International Airport;

- Bird Control at Schiphol, Amsterdam Airport Schipol (2019);
- Wildlife at Airports; Wildlife Damage Management Technical Series. U.S. Department of Agriculture, Animal and Plant Health Inspection Service (February 2017);
- Waterbird Deterrent Techniques. Exxon Biomedical Sciences, Inc. Marine Spill Response Corporation (1994);
- Upper Little River Watershed Master Drainage and Stormwater Management Plan, Environmental Assessment Environmental Study Report (Stantec, 2017 DRAFT); and,
- Bird Use of Stormwater Management Ponds: Decreasing Avian Attractants on Airports. Landscape and Urban Planning (Blackwell et al., 2008).

While the SWM ponds will be considered infrastructure owned by the City, risk assessment parameters and existing monitoring practises of WIA will need to be considered for the development of a waterfowl adaptive mitigation plan to ensure congruence.

As part of the risk assessment, WIA has several zones it uses to monitor avian species, as shown on Figure 1 (Attachment A):

Zone of No Tolerance – Runway areas within the Airport lands. Waterfowl are not permitted and are removed immediately.

Zone of No Confidence – Airport and private lands located adjacent to the runway areas. Wildlife officers monitor and remove waterfowl as necessary.

Zone of Monitoring – Lands present within a 2-4 km radius from the airport lands. All features containing habitat supportive of waterfowl (i.e., wetlands, SWM ponds etc.,) within this radius are monitored monthly by airport staff. Bird populations are monitored and removed if it is determined that they present danger to the airport.

The majority of the proposed SWM ponds are located within the Zone of Monitoring, however, two ponds, P1 and P3, overlap with the Zone of No Confidence (Attachment A – Figure 1).

While interactions with all species are documented by WIA, the key target species that have the potential to cause harm and hazards to human health and safety at the airport due to collisions are Canada Geese (*Branta canadensis*) and Ring-billed Gulls (*Larus delawarensis*). As such, the waterfowl adaptive mitigation plan has been developed to consider the behaviour and life history of these species. In addition, the waterfowl adaptive mitigation plan considers the existing and future conditions in the land use plan proposed for the Study Area.

In accordance with guidance documents provided by Transport Canada (2018), the following objectives are to be considered when developing a wildlife/waterfowl adaptive mitigation plan for SWM ponds within the vicinity of the airport:

- Determine and implement waterfowl management actions;

- Establish a monitoring program for all aspects of the monitoring program, including performance monitoring and annual reporting;
- Describe the roles and responsibilities; and
- Establish communication procedures with respect to wildlife hazards.

Descriptions for each of the objectives are provided in Section 3.1 below.

3.1 Waterfowl Management Actions

As mentioned above, direct bird strikes and hazards due to waterfowl would be limited to interactions with infrastructure and vehicles within the airport lands, however, mitigation is required in the greater SS area as a precaution to prevent the aggregation of waterfowl. In accordance with guidance recommendations provided by Transport Canada (2018), passive or active management measures were considered for the proposed SWM ponds. In the event that waterfowl do enter the proposed SWM ponds despite this, a notification system should be in place in order to communicate potential bird strikes.

Passive and active management measures fall within the following four principals of wildlife management:

1. Habitat Modification;
2. Wildlife Exclusion;
3. Behavior Modification; and
4. Physical Removal.

Habitat modifications incorporate engineering and landscaping designs to create spaces that are unappealing to waterfowl. The designs consider the life history patterns and preferences of key target species (Canada Geese and Ring-billed Gulls). Designed areas may limit the available habitat for foraging and nesting, or restrict terrestrial movement or space needed for flight (or takeoff/landing). The habitat modifications are considered passive management measures as they are integrated into the long-term function of the proposed SWM ponds.

Conversely, wildlife exclusion, behaviour modification, and physical removals are considered active management measures because effort is required to disperse wildlife. Wildlife exclusion refers to the application of netting or fencing which prevent access to areas. Behaviour modifications include the deployment of predator decoys, amplified distress calls, loud concussion Moises, laser light, falcons or dogs, and reflective flagging as a measure to deter wildlife by making areas appear unsafe. Finally, physical removals include acts to trap and relocate waterfowl from high risk areas to areas outside of the zone of monitoring.

The four principals outlined above present a hierarchy in management, with habitat modification identified as the first step to mitigation. The three remaining active strategies are intended to be employed as supplementary or temporary deterrents. To this end, it is anticipated that the majority of SWM pond wildlife management will be achieved by habitat modification.

3.1.1 Passive Management

Passive management consisting of habitat modifications for the SWM pond designs included several engineering and landscaping elements described in the following subsections.

SWM Pond Design

A representative cross section of the proposed SWM pond layout is provided in Attachment A – Figure 2.1 and Figure 2.2. It is noted that the dimensions provided in the cross section are considered variable and that the size of individual ponds may increase or decrease depending on the pond location within the landscape. Details pertaining to permanent pools only apply to wet ponds. The dimensions identified in this plan are considered approximate and are subject to adjustment during detailed design, however, the general shape and location on the landscape is assumed to be accurate for the purposes of the SSMSP.

The scale and dimensions of the ponds have been designed in accordance with the design criteria identified in the ULRMP (Stantec, Draft 2017). Details regarding the volume, outflow and quality criteria can be referenced in the SSMSP Stormwater Management Report. The geometric configuration of the SWM ponds have been established to accommodate the SWM criteria and to reduce the attractiveness of the ponds to waterfowl. The configurations and designs are generally in-line with the high-level recommendations provided in the ULRMP (Stantec, Draft 2017); which proposed a system of interconnected permanent pools surrounded by heavily vegetated plantings. Adapting from this schematic, SWM pond designs were adjusted in order to meet the feasible servicing needs of the Study Area, as well as to reduce the visible size of available open water. Based on additional research and guidance documents, long-linear ponds were chosen instead of the concept plans proposed in the ULRMP to reduce pond perimeter and area of open water (Blackwell et al, 2008). Furthermore, the orientation of the proposed SWM ponds on the landscape are positioned perpendicular to Runway 12-30 reducing the habitat footprint in the critical operational area of the runway.

As depicted in the cross-section, included in Attachment A, ponds P2, P4, P5-P8 have both permanent pools and active storage areas. Permanent pools are anticipated to contain water year-round, whereas the active storage areas are intended to collect and temporarily store stormwater during rain events. The permanent pool width has been kept to a maximum width of 15 m along all linear ponds. Considerations for narrowing the permanent pool further was reviewed, however, based on the total volume requiring settlement reduction to the permanent pool volume was not possible. Draw down period of 48 hours within the active storage area for the 1:100 year storm to ensure the area of open water is minimized during large rainfall events. For a 1:100 year storm events, the maximum water level is approximately 0.5 m to 2.5 m below the top of bank, the remaining pond volume is considered surplus for storm events more severe than a 1:100 year storm.

In the proposed cross-section, the side slopes of the permanent pool were designed to have steep slopes (1.5:1) to ensure the collected stormwater is deep and prevents the growth of emergent and floating vegetation (food for waterfowl). The deep water storage has a two-fold design benefit, as wading and swimming species are deterred from areas containing deeper water, as it is difficult to

observe underwater predators. The sloped edges of the permanent pool and active storage areas provide uneasy staging and nesting conditions for waterfowl as visibility is reduced and predator detection is limited. This deviates from the pond design proposed in the ULRMP (Stantec, Draft 2017) report, where larger flat areas were proposed at the permanent pool water level. Those areas would promote growth of plantings that these species eat and provide places for nesting and therefore have been eliminated from the functional design. More narrow, heavy planted benching areas will be incorporated at 50 m intervals along the length of the pond as a mechanism to provide additional woody vegetation for the purposes of limiting the appearance of a visual water runway to geese and gulls during flight. Finally, outlets and pump stations will be designed to have the functionality to completely drain permanent pools for maintenance as well as for waterfowl mitigation purposes.

For Dry ponds, measures to mitigate growth of attractive vegetation along the bottom surfaces shall be implemented along with all other screening measures described.

In summary, engineering design elements have been incorporated into the proposed SWM pond designs to achieve waterfowl management in the following ways:

- Linear SWM ponds limit the area of surface water visible to flying waterfowl;
- Linear SWM ponds provide insecure habitat to foraging and nesting waterfowl (cannot hide in open habitat; closer access to predators along banks);
- Benching provide along SWM pond length will add additional vegetation to break-up the appearance of a 'visual runway' from the sky;
- Deep permanent pools prevent growth of submergent aquatic vegetation (food for ducks);
- Deep permanent pools provide habitat insecurity as waterfowl cannot easily detect underwater predators;
- Fast draw-down period (48 hours) in active storage areas limit open water available during storm periods; and
- Design outlets and pump stations will have the functionality to drain permanent pools for maintenance and as extreme waterfowl mitigation.

Landscaping

Typical SWM pond designs in parks and residential areas may include grassed areas that are regularly mowed; these types of SWM ponds and associated landscaping are preferred by geese as the mowed grass provides a source of food, and clear line of site for observing predators. Mowed grassed areas are also preferred by ducks and geese as they provide a clear pathway for movement and flight take off.

Conversely, Blackwell et al. (2008), The City of Hamilton (2009), and the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (2017) recommends that woody vegetation be planted within the active storage area of the SWM pond as a mechanism to deter geese and ducks by providing a difficult terrain to navigate, as well as to provide limited canopy cover over the permanent pool to further reduce the visibility of open water from the sky.

Edges of the active storage area are tapered to gradually descend toward the permanent pool, the maximum depth of the active storage area is 2.7 m, including freeboard. As mentioned above, the active

storage area is meant to collect surface flows up to the 1:100 year storm event. As such, woody species chosen to be planted within the active storage area have been chosen based on their ability to withstand periodic flooding, and to grow tall enough so that they would not be completely submerged during large storm events. The shrub and willow species chosen are also preferred as the height achieved at maturity does not exceed the allowable height within the runway approach surface.

A list of species included in the planting detail include the following:

- Bebb's Willow;
- Peach-leaved Willow;
- Pussy Willow;
- Button Willow;
- Red-osier Dogwood;
- Gray Dogwood;
- Eastern Ninebark;
- Nannyberry and other Viburnum species; and
- Cloudberry.

Woody vegetation should be planted fairly densely (0.5 m on the center) in order to provide an effective deterrent to waterfowl. It is intended that these plantings will be naturalized so regular maintenance by the City of Windsor is not anticipated.

A representative detail for plantings proposed within a 20 m length of the active storage area is provided in Attachment B – Detail 1. Renderings of the planting plan illustrated as a cross-section of the SWM ponds and proposed benching are also provided in Attachment B – Details 2 and 3. It is intended that the plans provided in Attachment B can be extrapolated to cover the length of the SWM pond. A high-level costing list has been included alongside the planting plan detail to provide an approximate cost for the landscaping designs; it is noted that larger stock (35 mm Cal. B.B. trees and 50 mm ht. 3 shrubs) have been included in this estimate because these trees will take less time to reach maturity. Cost estimates for smaller stock may be less, however, will take longer to provide maximum canopy cover over the active and permanent pools.

As it is anticipated that the species identified for planting the active storage area will take between two and five years to mature in height. Interim measures such as netting and cabling are recommended for mitigation before sufficient canopy cover to the permanent pool can be achieved (Refer to Table 1 for a list of all the measures). Wherever possible, SWM ponds should be placed adjacent to areas with mature trees (hedgerows, woodlands, swamps, etc.) in order to make use of the existing canopy cover. The placement of SWM ponds adjacent to retained natural heritage features should be located outside of buffers assigned to protect the ecological form and function. It is noted that a 30 m buffer is typically assigned to PSWs, whereas a minimum 15 m buffer is applied to the top of bank of watercourses such as the Little River; buffer areas are intended to be planted with natural vegetation to provide additional protection to the retained features. For this reason, trails, access roads and pathways associated with the SWM pond designs may not be permitted within buffer areas.

It is generally recommended that the conditions of the SWM ponds be monitored by the City once per month during the growing season (April – October) to ensure the passive management mitigation is established and is working effectively to restrict available habitat. Maintenance for the proposed SWM ponds should be conducted so that disturbance to the planted vegetation within the active storage area is minimized. Dredging within the permanent pool should be conducted outside of the migratory and breeding windows for waterfowl so that potential impacts to the canopy cover. Dredged materials/raked algae should be taken offsite so that potential food sources for waterfowl are removed.

For future maintenance of the permanent pool area, lane ways and clear areas will need to be accommodated in planting plans; it is anticipated that laneways to access the permanent pool will be required every 50 m along the length of the SWM ponds. Refer to the Waterfowl Mitigation Pond Segment Plan Figure included in Attachment B. It is recommended that access paths as well as areas adjacent to maintenance corridors be planted using Canada "Certified" seed or "Canada No. Lawn Grass Mixture" which were specifically developed to deter geese. The composition of the grass seed mixtures consists of the below ratio:

- 45% RTF Rhizominous Tall Fescue;
- 20% Kent Creeping Red Fescue;
- 25% Primary Perrennial Ryegrass;
- 5% Shark Creeping Bentgrass; and,
- 5% Leo Birdsfoot Trefoil.

It is recommended that grassed areas be allowed to naturalized and not mowed as another deterrent to limit terrestrial geese movement.

The addition of armor landscaping stones to the edges of SWM pond blocks and outside of the planted woody vegetation should also be included in planting details. Large rocks are difficult for ducks and geese to navigate around by foot and are considered a deterrent. In addition, chain link fencing may be installed along the edge of woody vegetation of the active storage areas to prevent terrestrial movement of waterfowl and geese into the SWM pond area.

Muskrat Management

While Muskrat (*Ondatra zibethicus*) are not a target species, the life history and habits of this aquatic mammal may provide reciprocal benefits to waterfowl. Muskrat build mounds with stalks and reeds of emergent vegetation at entrances to burrows which are excavated along the banks of watercourses, wetlands, and in urban settings. The external mounds of vegetation provide ideal nesting sites for waterfowl. As such, additional mitigation should be considered to manage and mitigate their presence within municipal infrastructure as a mechanism to prevent the mutual attraction of waterfowl to these areas.

To remove or mitigate Muskrat habitat, it is recommended that chain-link fencing be applied horizontally to the ground surface along the interface of the active storage area and permanent pool. The metal fencing will prevent burrowing and therefore deter Muskrat from inhabiting the SWM Ponds. While permanent pools have been sized to prevent the growth of aquatic vegetation, invasive species

including Common Reed (*Phragmites australis*) are known to be pervasive throughout Southern Ontario and therefore should be anticipated to occur overtime. The spacing of holes for the metal chain-link fencing will not prevent the growth of woody species identified in planting plans for the active storage area.

3.1.2 Active Management

Active management mitigation is intended to exclude or remove waterfowl from the proposed SWM ponds. These active mitigation measures are intended to supplement the passive management strategies incorporated into the designs for the SWM ponds and associated landscaping.

As it is understood that residential, business park, commercial and institutional land uses are proposed within the SS area, the active management mitigation discussed herein is limited to devices and techniques that are unlikely to disturb the public (i.e. pyro techniques, gas cannons, report shells, loud sirens/bangers). In addition, active management mitigation that would be able to coexist with the proposed plantings in the active storage areas of the SWM pond would be preferred. Descriptions of, and details for the active management mitigation identified as a good fit for the proposed SWM ponds are described in Table 1.

For any of the active management mitigations chosen, it is recommended that signage be posted along trails and access roads to SWM pond blocks to notify the public of the mitigation in use in order to provide awareness and to reduce vandalism.

Table 1: Supplementary SWM Pond Active Management Mitigation for Waterfowl Deterrents

Deterrent	Description	Wildlife Management Principal	Advantages	Disadvantages	Materials and Approximate Cost (assumes 20 m length of SWM pond)	Anticipated Monitoring Schedule	Recommendation
Tension Wire/ Netting Suspended Over Pulley System	Cable pulley system installed using wooden poles to suspend netting over active storage and permanent pool areas of SWM ponds to exclude waterfowl from landing. Netting can be deployed year round or be lowered or raised seasonally, depending on need.	Wildlife Exclusion	• Effective exclusion achieved. • Can be deployed seasonally or year-round as needed. • Can be combined with other mitigation techniques. • Does not interfere with quality of life for neighboring residents (no light or sound emitted).	• Large installation required to set up; not easy to take down once installed. • Requires monthly monitoring and maintenance to ensure working properly. • Maintenance may be difficult once vegetation matures to full height • Structures may be prone to unwanted vegetation growth (vines). • In rare cases, birds may become tangled in netting (can be mitigated with flags/reflective tape).	4 poles, each approximately 8 m high and supported in a concrete base. Assumes panels for 20 m length of pond, 45 m wide will cover area of 900 m^2. One pole will be installed on each corner in a rectangular shape. Each pair of poles will support 4.8 mm diameter stainless steel cables (4 cables total = two 45 m, two 20 m) which will support monofilaments (40 lb test fishing line) spaced approximately 2 m intervals along the cables (10 monofilaments stretched over the active and permanent ponds over the 20 m length; 225 m). Each stainless-steel cable will be attached at the north end to a fixed eye strap with a carbine hook. The cable panel's tension will be adjustable through a system of boom bails attached to a "T' track. A similar system has been deployed by the City of Ottawa for two pedestrian beaches; see Attachment C for detailed drawings). <u>Cost Estimate for Key Components</u> 8 m Wooden Poles: $350 each x 4 = $1400 Concrete (320 lbs total – 80 lbs per post): $600 130 m of 4.8 mm stainless steel cable: $200 450 m 40 lb monofilament: $60 Initial set up: 1 week: 40 hours of labour Monitoring by City Staff – one 10 hour day per month (120 hours of labour).	Can be used year-round (weather permitting). Peak season this system should be deployed is during the migratory and breeding seasons (April-November). System should be monitored by City Staff once a month when deployed to ensure no damage. Inspections may be required more often following periods of bad weather.	Recommended for ponds as interim mitigation while woody vegetation in active storage area matures. Recommended for open areas or areas where no other natural woody vegetation exists (i.e. retained hedgerows, forests, swamps).
Flags, Reflective tape	Flags consisting of either opaque plastic (red, orange or black) or reflective materials installed using stakes or on wires/cables over permanent and active storage areas.	Behaviour Modification	• Can be deployed simultaneously with netting (above) • Humane deterrent for waterfowl • Effective deterrent against waterfowl • Does not make noise • Cheap to replace	• Can become damaged/removed due to poor weather May be visually distracting to pedestrians during the day time.	Reflective bunting safety flags (45 flags per 30 m roll; orange - $30 each). For a 20 m length of pond it is recommended that two 30 m rolls of flags be spaced 5 m apart across the 15 m width of the permanent pool (90 flags per 20 m stretch).	General inspection should occur once a year alongside installation and deployment of greater cable system.	Recommended for open areas or areas reported to have high volumes of waterfowl. Recommended to be deployed alongside cable pulley system.

Deterrent	Description	Wildlife Management Principal	Advantages	Disadvantages	Materials and Approximate Cost (assumes 20 m length of SWM pond)	Anticipated Monitoring Schedule	Recommendation
	Movement of flags/reflective surfaces scares waterfowl, as well as indicates placement of netting suspended over SWM ponds.				Cost for two rolls: $60	If flags are installed independently they should be inspected by City staff once every month to ensure they are in place; inspections may be required more often in times of bad weather.	
Lights/lasers	Low-level solar powered strobe lights installed along the edges of the permanent pool. Lights emit a series of quick flashes every two seconds with 360-degree coverage. Lights are to be installed at "goose height" for the purposes of deterring them. Geese have sensitive eyes and cannot sleep when lights are deployed.	Behaviour Modification	- Highly effective; self-sufficient. - Easy to install and replace. - Humane deterrent for geese. - Installation within the areas of woody vegetation would reduce the amount of light seen in residential areas and roads.	- Installation/placement of lights are limited to SWM pond interior; cannot be installed near roadways. - Lights may attract pedestrians to ponds at night. - Additional signage may be required to inform residents.	Industrial Geese Deterrent Strobe Lights: $400/unit. One recommended for every 100 m length of SWM pond.	Should be inspected monthly by City staff to ensure lights remain installed in place and solar batteries are working effectively.	Recommended for SWM ponds located away from residential subdivisions to not disturb residents. May be used in interior sections of ponds located away from residential areas or roadways.
Predator Decoys and Light Deterrents	May consist of plastic models of coyotes or alligators. Coyote decoys can be installed within or adjacent to the active storage areas. Alligator decoys may be deployed within the permanent pools. Low level lights mimicking predator eyes/eye shine may also be deployed for nocturnal deterrents.	Behaviour Modification	- Effective for short-term deployment. - Easily mobile; can be relocated efficiently.	- Decoy needs to be moved around to new areas to be seen as effective. - High habituation rate - May be subject to vandalism/theft.	Terrestrial Coyote Decoy: $150/unit Floating Alligator Decoy: $70/unit Solar powered Predator Eye Lights: $110/ 4 units 1 decoy recommended per 2 ha of SWM pond	Should be inspected/moved by City staff once every two weeks while in use to reduce likelihood of habituation by waterfowl.	Should not be used for long-term use. Should be deployed as interim measure for other mitigation/deterrents.

Deterrent	Description	Wildlife Management Principal	Advantages	Disadvantages	Materials and Approximate Cost (assumes 20 m length of SWM pond)	Anticipated Monitoring Schedule	Recommendation
Falconry	A trained bird of prey (falcon, hawk or eagle) is released in the area by a handler for the purposes of scaring and expelling waterfowl from an area.	Behaviour Modification	- Effective for short term deployment and removal. - Can be used as needed. - No monitoring required.	- Expensive and laborious; requires contractor to be on site. - Likely requires repeat visits to achieve success. - Permitting may be required for the handling of falcons/use of drones.	Up to $1200.00 - $2500.00 or more per visit by a licenced professional.	No monitoring required.	Recommended as needed to remove waterfowl detected within SWM Ponds.
Drones	A drone is maneuvered by an operator over a SWM pond for the purposes of scaring or expelling waterfowl from an area.						
Capture and Release	A licensed wildlife control officer will trap and remove nuisance waterfowl and release them to areas well outside of the jurisdiction of the airport	Physical Removal	- Ensures direct removal nuisance wildlife from area. - Can be used as needed as last resort.	- Cannot guarantee waterfowl will not return after trapping and removal. - Expensive - Permitting may be required for handling, trapping and transporting waterfowl. - Unpopular with the general public.	Up to $5,000 – $7,000 or more per visit by licenced wildlife professional. Dependent on the level of effort and amount of geese.	No monitoring required; unless otherwise stated in required permits.	Recommended as needed to remove persistent waterfowl detected within SWM Ponds.

As noted in Table 1, several mitigation/deterrent techniques are proposed based on the existing conditions associated with anticipated location of each individual SWM pond within the SSMSP Area. A matrix which outlines appropriate active management strategies per ponds identified in Attachment A – Figure 1 is provided in Table 2. In addition, the active management techniques may be deployed as supplementary mitigation, as needed, to provide cover during periods of maintenance or to improve deterrence methods as a form of adaptive management. The supplementary active management mitigation may also be used to remove waterfowl should they be detected within SWM ponds during regular monitoring.

Table 2: Active Management Strategies SWM Pond Matrix

Active Management Strategies	Stormwater Ponds[1]										Notes
	East Pelton (EP)		Baseline Road/County Road 42 SPA (CR42SPA)				Little River		Lauzon Parkway		
	EP North (P1)	EP South (P2)	CR42SPA West (P3)	CR42SPA Central (P3)	CR42SPA East (P3)	CR42SPA SE (P6)	East Little River (P4)	West Little River (P5)	Lauzon Parkway East (P7)	Lauzon Parkway East (P8)	
	Dry	Wet	Dry	Dry	Dry	Wet	Wet	Wet	Wet	Wet	
Wildlife Exclusion											
Tension Wire/Netting Suspended Over Pulley System	---	✓	---	---	---	✓	---	✓	---	✓	Temporary installment recommended for wet ponds throughout Study Area except for areas where existing woody vegetation (woodland, hedgerows) are being retained.
Landscaping stones, fencing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Appropriate for use throughout Study Area.
Behaviour Modification											
Flags, Reflective Tape	---	✓	---	---	---	✓	✓	✓	✓	✓	Appropriate for use throughout Study Area. May not be necessary for dry ponds.
Lights/Lasers	---	---	---	---	✓	✓	---	✓	✓	✓	Recommended in SWM ponds located away from residential land uses
Predator Decoys and light deterrents	---	✓	---	---	-	✓	✓	✓	✓	✓	Appropriate for use throughout Study Area. May not be necessary for dry ponds.
Falconry/Drones	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Appropriate for use throughout Study Area.
Physical Removal											
Capture and Release	---	---	---	---	✓	✓	✓	✓	✓	✓	Recommended for use in SWM ponds located away from residential land uses.

1- Pond names depicted on Figure 1 of Attachment A

Notification System

To maintain congruency with monitoring conducted by WIA, the identification of waterfowl within the additional SWM ponds proposed within the Zone of No Confidence and Zone of Monitoring should continue to be carried out by the WIA Staff. Should waterfowl be observed within the SWM Ponds, the City should be notified by WIA and be required to remove waterfowl via active management techniques. The City would be responsible for confirming to WIA that they have been successful in excluding/removing waterfowl from the area; the City would also be responsible for recording all occurrences of waterfowl identified within the proposed SWM pond.

For SWM ponds proposed to be located within the 'Zone of Monitoring' monitored by WIA, monitoring for the presence of waterfowl is required. Should gulls, ducks or geese be observed by the City or WIA, the observances must be documented and the waterfowl potentially removed. Notification of this activity must be provided to WIA for due diligence purposes.

3.2 Adaptive Mitigation Plan

Monitoring Methods

As mentioned above, the majority of SWM ponds are proposed to be located within the Zone of Monitoring. WIA is required to monitor features providing potential habitat once per month as part of their risk assessment. To maintain congruency with existing monitoring plans of the airport, monitoring of the new ponds should be conducted once per month to observe and document the presence of waterfowl. Similarly, monthly monitoring should also be conducted within the SWM ponds to ensure that landscaping and engineering designs (habitat modifications) are working effectively. Monthly monitoring will consist of single site visits to each feature/SWM pond to visibly assess if waterfowl are present (species and number), evidence of woody vegetation dieback, or damage to the SWM ponds is present. Key performance indicators (KPI) to be assessed during monthly monitoring will evaluate the effectiveness of the wildlife management initiatives by their ability to deter and exclude waterfowl from the Zone of No Confidence and Zone of Monitoring through active and passive management. In short, the City will aim to continually improve waterfowl management mitigation through the implementation of the wildlife management hierarchy for the purposes of reducing the occurrence of waterfowl on City-owned lands within the vicinity of the airport.

Adaptive Management

The management of waterfowl will be dependent on the location of SWM ponds within the Study Area. Two SWM ponds, pond P1 and P3, are proposed within the Primary Hazard Zone and in line with the approach area of runway 12-30 (Attachment A – Figure 1). The remaining ponds (P4, P5, P6 P7, P8) are located within the 2km-4 km outer radius in the Zone of Monitoring.

Based on this plan and alignment with ongoing monitoring of WIA, waterfowl observed in SWM ponds within the Zone of No Confidence or runway approach surface along Baseline Road will be immediately

removed by supplemental active management measures (exclusion, behavioural management, and physical removal). On the other hand, waterfowl observed as a result of monthly monitoring within the greater Zone of Monitoring will be documented and continually monitored. Monitoring may increase in frequency if necessary, and deterrents and removals may be applied on a site-by site basis as determined by a Wildlife Management Officer. The management of waterfowl present within features of the Zone of Monitoring will be initiated by the number of waterfowl observed and the frequency of SWM pond use.

Supplementary active management mitigation should be deployed to the target SWM pond as a mechanism for preventing further aggregations of waterfowl. The additional mitigation (Table 1 and Table 2) will be chosen based on the behaviour of the offending species, the adjacent land uses, and degree of habituation. The SWM pond and new mitigation will be monitored closely and checked after initial deployment to ensure waterfowl are deterred. Should waterfowl persist within the SWM ponds after this period, a new or additional mitigation should be deployed. It is recommended that installed mitigation remain in place during the spring (March –May) and fall migration windows (September - November), as these are considered high risk time periods when waterfowl are expected to travel through the SSMSP area in high numbers.

Outside of the migration windows, deployed temporary mitigation may be removed/halted for select SWM ponds should it be determined through monitoring that waterfowl have been successfully excluded and are no longer present within or in lands adjacent to the zone of no confidence.

As a last measure, SWM ponds may be temporarily drained in circumstances where waterfowl mitigation has failed until persistent waterfowl have been removed/displaced.

Reporting

A record of waterfowl removals, and adaptive management will be recorded as part of a wildlife management log. The log will list the detection events including start and finish times, the numbers and species present, as well as the methods used for removal. In addition, the logs will report any changes or maintenance to the passive management mitigation associated with the SWM pond engineering or landscaping.

A summary of the wildlife management logs will be produced once a month in order to discuss any environmental changes that may have occurred, or changes that may lead to wildlife hazard conditions that may increase risk to the adjacent airport lands. The monthly summary reports will be provided to WIA for review to assist with their risk assessment initiatives.

3.2.1 Outcomes and Lessons Learned

There are two cumulative effects to consider to which there is very little opportunity to predict outcome once a SWM feature is constructed. How mitigation of these affects has been implemented locally at the

other SWM ponds in the area has been included as Case History below. These notes have been provided by former WIA staff involved in these mitigation activities.

One is the cumulative effects of SWM ponds is multiple or extensive habitats combining to attract wildlife acerbating a problem of overall management. How ponds in the vicinity of open grassland (airfield), agricultural land or other natural or man-made wetlands interact to support wildlife. For reference, Figures in Attachment A, show the existing stormwater management ponds located in the vicinity of the Windsor Airport. Central Pond is located at the southeast corner of Grand Marais and Central Avenue

Case History: The creation of a SWM pond at Grand Marais and Central Avenue caused an immediate wildlife hazard from Canada Goose loafing overnight on the safety of the open pond and flying the short distance over the E.C. Row Expressway to graze by day on the grassland along Runway 07-25. This situation was eventually mitigated by mechanically pumping down the pond until trees and course vegetation could be established. Now with appropriate cover, the pond is no longer attractive to geese and the proximity to foraging at the airport is dissolved.

The second cumulative effect is called Founder's Effect. This occurs when geese and ducks do manage to successfully nest and fledge young on or in the vicinity of a pond to which the fledged birds return as breeding adults. It is the main reason that relatively small populations of Canada Geese so quickly become burgeoning populations on single ponds.

Case History: The Captain Wilson Park SWM Pond and associated manicured turf grass fields surrounding the pond, in the course of 5 years saw a population of 3 nesting pair develop into 226 individual birds. This situation is managed with periodic round up and re-location of geese in an attempt to immediately reduce the number of birds in the vicinity of the airport and to by-pass Founder's Affect in relocated juvenile birds.

3.3 Roles and Responsibilities

The proposed SWM ponds are to be constructed on the landscape via a phased approach to follow the phased construction of developable areas detailed on the established of the land use plan. Section 1.2 of this memo indicated that the SWM ponds located south of Baseline Road to the far west within the East Pelton Secondary Plan area (P1), as well as the pond located adjacent to the Lauzon Parkway (P7 and P8) will occur first (Attachment A – Figure 1). The remaining SWM ponds will be added to the landscape as development continues within the East Pelton and Country Road 42 Secondary Plan Area, to the east along County Road 42 Secondary Plan Area and along the Little River.

As it is intended that the ownership of the SWM pond infrastructure will be conveyed from individual land owners (the proponents) to the City, it is understood that responsibility for and management of the ponds will change over time as development within the Study Area continues through the Construction, Post-Construction and Implementation Phases. The following sections recommend monitoring and

reporting procedures. The actual procedures should be developed by the City and WIA collaboratively and updated throughout implementation based on lessons learned.

Design

Detailed design of the stormwater management facilities shall follow the most current Transport Canada, airport and regional guidelines. Each pond has a unique location, orientation and proximity to the airport runways. The design shall consider site specific elements such as, but not limited to, plane altitudes, flight paths, bird migration patterns, maintenance access. In addition to the typical municipal review, the designs shall be reviewed with Transport Canada and the Airport to confirm that the designs satisfy mitigation requirements listed herein.

Construction and Post-Construction Phase

Construction of the SWM ponds are intended to be carried out by proponents of each development application. As part of the construction phase, it is anticipated that initial monitoring of the SWM ponds and landscaping will be carried out by the proponent as part of an Environmental Monitoring Program (EMP) to ensure the constructed infrastructure and plantings are successful. The length of the construction and post-construction monitoring periods are to be determined as part of the draft plan and detailed design process; however, it is anticipated that construction monitoring will occur during the active construction period, and post-construction monitoring will be required for at least three years once construction is complete.

Since habitat modification is a key component of the engineering and landscaping designs, monthly waterfowl and SWM pond monitoring should be included and carried out as part of the EMPs by the proponent during the construction and post-construction phases.

During the construction and three-year (minimum) post-construction period, supplementary mitigation or active management strategies will also be deployed as a responsibility of the proponent. Monthly monitoring reports which detail waterfowl mitigation and monitoring shall be provided to the City by proponents on a monthly basis to provide a record of adaptive management taken at each SWM pond. Monitoring and mitigation carried out by individual proponents should be documented by a Wildlife Management Officer, nominated by the City, who will act as the conduit of information between proponents, the City, and WIA.

Implementation Phase

Following the completion of the EMP and post-construction monitoring period, it is anticipated that the ponds will be conveyed to the City for their long-term management. At this time, senior City staff/Wildlife Management Officer, will be responsible for coordinating, supervising and the overall management of the waterfowl management plan on a long-term and a daily basis at the site-specific level. This will include the co-ordination of training, safety assurance and ensuring that the necessary equipment is available. Senior City Staff will also be responsible for conveying monitoring results to operations managers at WIA.

The Wildlife Management Officer should be responsible at a minimum for:

1. Establishment and maintenance of the Waterfowl Management Log (e.g., details on wildlife numbers and activity; mitigation measures undertaken, adaptive management requirements, and monthly summaries);
2. Co-ordination of the monitoring program;
3. Ensure that the City's monitoring operations are consistent with the requirements of WIA;
4. Ensure plantings included in the active storage areas of the proposed SWM ponds are maintained and healthy as expected;
5. Undertake deterrent activities;
6. Ensure all activities are undertaken following standard practices and safety protocols; and
7. Identify equipment, resource and training needs.

3.3.1 Communication Procedures

The following communication procedures should be established for the purposes of waterfowl management by the City:

1. Waterfowl detection information will be provided directly from monitoring staff to the Waterfowl Management Officer of the City.
2. The Waterfowl Management Officer will be responsible for ensuring that updated information is provided to WIA immediately if an urgent situation arises and on a regular basis depending on the conditions, or when requested by WIA. WIA will also relay any information received regarding waterfowl observations to monitoring staff and the City in a timely manner.
3. WIA will provide information to pilots on current wildlife hazards and will ask pilots to report any waterfowl observations to the airport.
4. Waterfowl activity will be regularly updated by the City in daily logs and monthly summary memos.

4.0 Closure

The recommendations of this document will be incorporated into the development standards that will become part of the minimum design standards and implementation plan for this area. This document shall be reviewed regularly by the City of Windsor and Winsor International Airport staff to confirm that the implementation, monitoring and maintenance recommended above are providing sufficient mitigation to meet safety requirements throughout the life cycle of these facilities.

Regards,

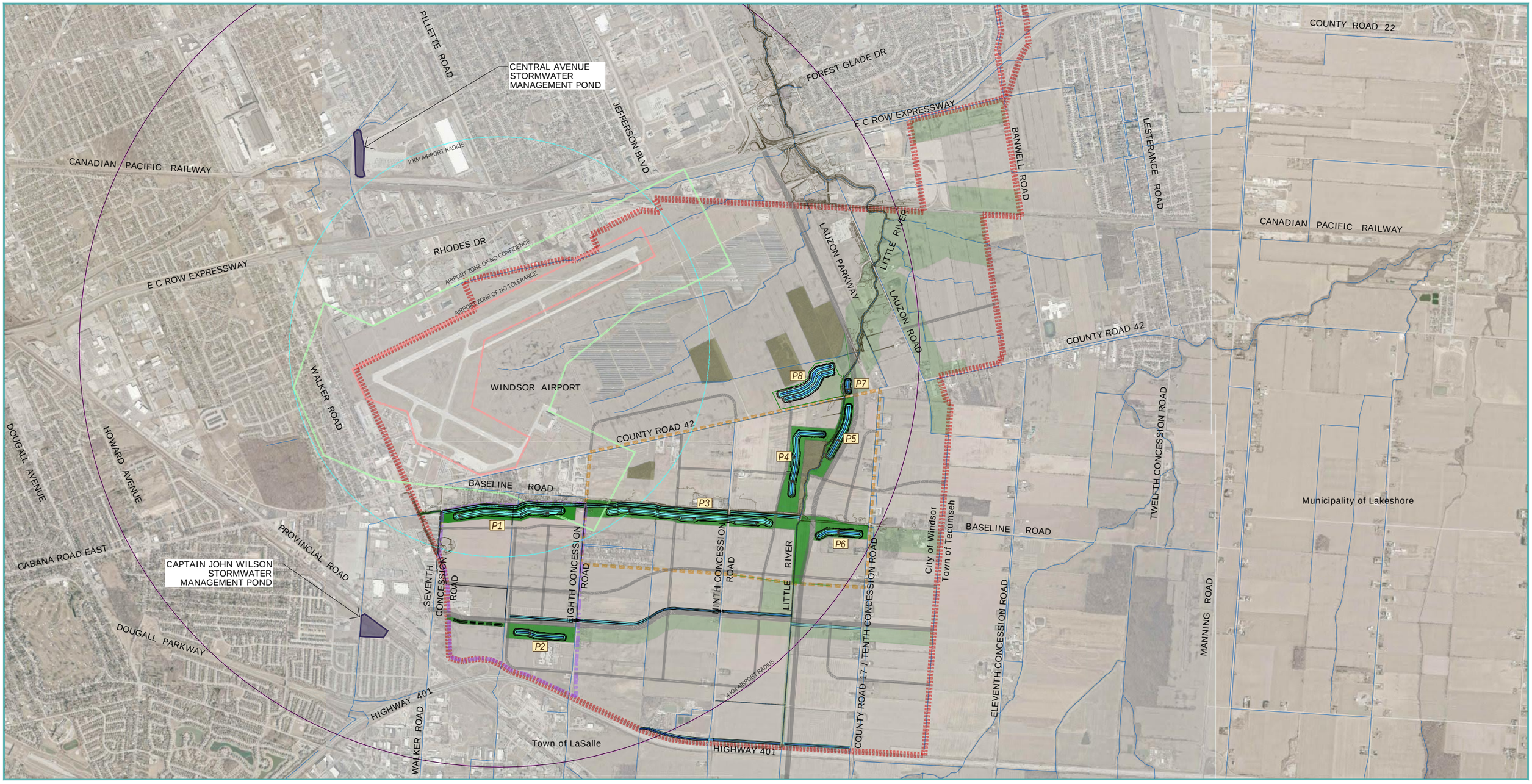
Caitlin Vandermeer, P.Eng.
Senior Biologist

Laura Herlehy, P.Eng.
Project Engineer

Attachment A

Figures

DILLON
CONSULTING



SANDWICH SOUTH MASTER SERVICING PLAN

FIGURE 1
Waterfowl Adaptive Mitigation Plan
STORMWATER MANAGEMENT STRATEGY
WINDSOR AIRPORT MONITORING

- STUDY AREA
- EAST PELTON SPA
- CR42 SPA
- FUTURE COLLECTOR AND ARTERIAL ROADS
- EXISTING STORMWATER MANAGEMENT PONDS
- OPEN SPACE / STORMWATER MANAGEMENT CORRIDOR
- NATURAL HERITAGE AREA
- P1 TYPICAL POND NAME
- STORMWATER MANAGEMENT POND- PERMANENT POOL
- STORMWATER MANAGEMENT POND - ACTIVE STORAGE
- MUNICIPAL DRAIN RELOCATION OR NEW DRAIN

AIRPORT ZONES LEGEND
- 2 KM RADIUS FROM AIRFIELD CENTRE (WILDLIFE CONTROL ZONE)
- 4 KM RADIUS FROM AIRFIELD CENTRE (WILDLIFE CONTROL ZONE)
- ZONE OF NO TOLERANCE
- ZONE OF NO CONFIDENCE

THE CITY OF WINDSOR ONTARIO, CANADA
DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY CITY OF WINDSOR 2019, MNRF 2019, TOWN OF TECUMSEH 2019, *ESSEX REGION CONSERVATION AUTHORITY 2019, **COUNTY OF ESSEX

CREATED BY: RBH
CHECKED BY: LMH
DESIGNED BY: DCR
MAP COORDINATE SYSTEM: NAD 1983 CSRS UTM Zone 17N

*DEM - CGVD28:78 DEM SURFACE DERIVED BY ERCA BASED ON MNRF LIDAR - DIGITAL TERRAIN MODEL (2016-18). COPYRIGHT ERCA, 2019. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO. (WWW.ONTARIO.CA/PAGE/OPEN-GOVERNMENT-LICENCE-ONTARIO)

**2019 IMAGERY - THE DIGITAL MAP LAYERS HAVE BEEN USED WITH EXPRESS PERMISSION OF THE CORPORATION OF THE COUNTY OF ESSEX

SCALE
0 200 800 2000m

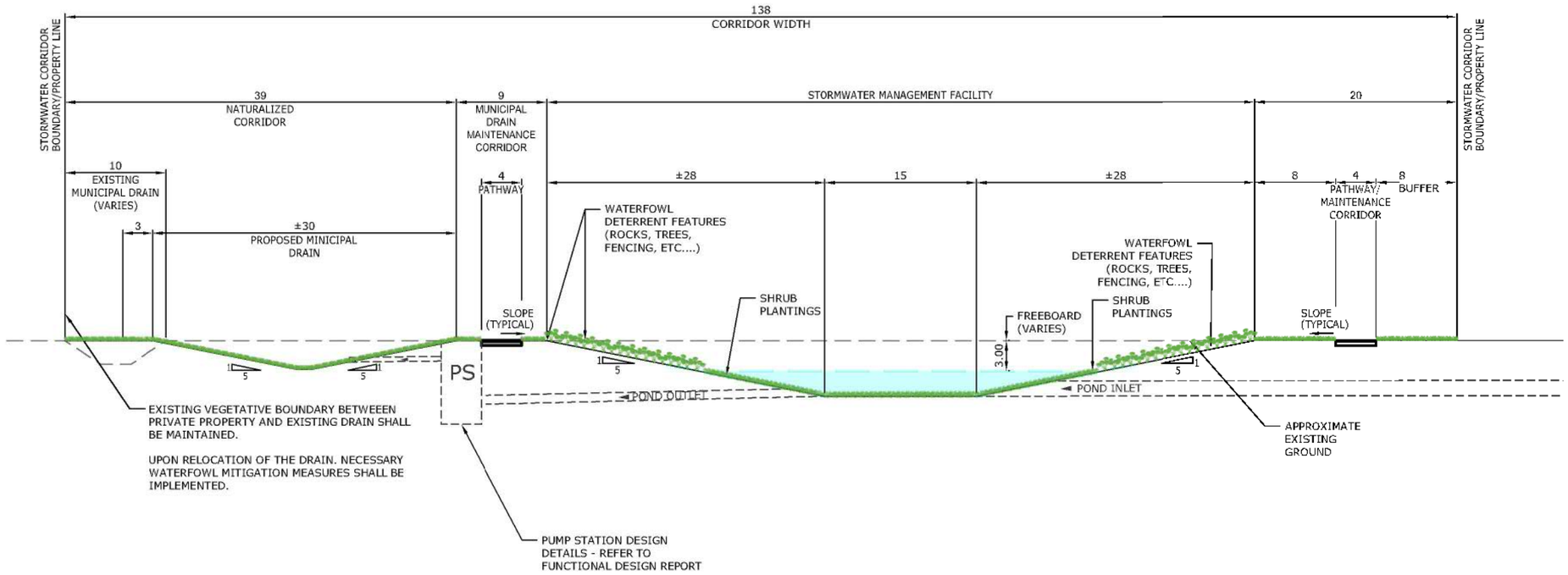
N
W E

STATUS: FINAL
PROJECT: 19-9817
DATE: April 11, 2023

File Location: c:\pw working directory\projects 2019\32rbh\dms90713\199817-02-swm-pnds_airport.dwg April, 11, 2023 7:07 AM

NORTH

SOUTH



EAST PELTON NORTH (P1)

SANDWICH SOUTH MASTER SERVICING PLAN

P1-STORMWATER MANAGEMENT CORRIDOR (DRY POND)
FIGURE 2.1

STORMWATER MANAGEMENT POND - ACTIVE STORAGE

THE CITY OF WINDSOR ONTARIO, CANADA

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY CITY OF WINDSOR 2019, MNRF 2019, TOWN OF TECUMSEH 2019, *ESSEX REGION CONSERVATION AUTHORITY 2019, **COUNTY OF ESSEX

MAP CREATED BY: DCR
MAP CHECKED BY: LMH
MAP COORDINATE SYSTEM: NAD 1983 CSRS UTM Zone 17N

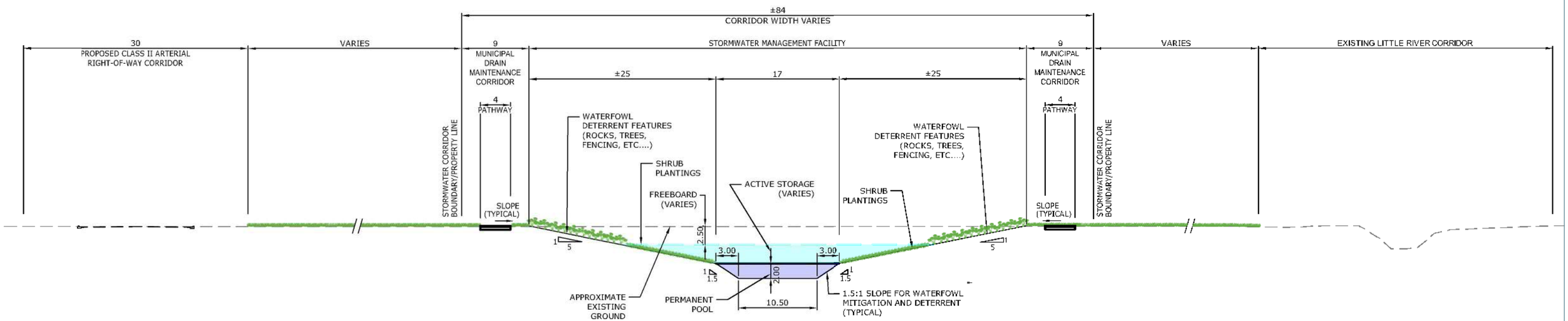
*DEM - CGVD28:78 DEM SURFACE DERIVED BY ERCA BASED ON MNRF LIDAR - DIGITAL TERRAIN MODEL (2016-18). COPYRIGHT ERCA, 2019. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO. (WWW.ONTARIO.CA/PAGE/OPEN-GOVERNMENT-LICENCE-ONTARIO)

**2019 IMAGERY - THE DIGITAL MAP LAYERS HAVE BEEN USED WITH EXPRESS PERMISSION OF THE CORPORATION OF THE COUNTY OF ESSEX

SCALE
0 2 10 25m

STATUS: FINAL PROJECT: 19-9817 DATE: March 28, 2023

File Location: c:\pw working directory\projects 2019\3210\dcr\dma70974\199817-10-pic typ swm corridor xsections v2.dwg March 28, 2023 9:42 AM



CR42SPA NW (P4)

SANDWICH SOUTH MASTER SERVICING PLAN

STORMWATER MANAGEMENT CORRIDOR
WITH OFFLINE FOREBAY
FIGURE 2.2

STORMWATER MANAGEMENT
POND- PERMANENT POOL

STORMWATER MANAGEMENT
POND - ACTIVE STORAGE

MAP DRAWING INFORMATION:
DATA PROVIDED BY CITY OF WINDSOR 2019, MNRF 2019, TOWN OF TECUMSEH 2019, *ESSEX REGION CONSERVATION AUTHORITY 2019, **COUNTY OF ESSEX

MAP CREATED BY: DCR
MAP CHECKED BY: LMH
MAP COORDINATE SYSTEM: NAD 1983 CSRS UTM Zone 17N

*DEM - CGVD2013 DEM SURFACE DERIVED BY ERCA BASED ON MNRF LIDAR - DIGITAL TERRAIN MODEL (2016-18). COPYRIGHT ERCA, 2019. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO. (WWW.ONTARIO.CA/PAGE/OPEN-GOVERNMENT-LICENCE-ONTARIO)

**2018 IMAGERY - THE DIGITAL MAP LAYERS HAVE BEEN USED WITH EXPRESS PERMISSION OF THE CORPORATION OF THE COUNTY OF ESSEX

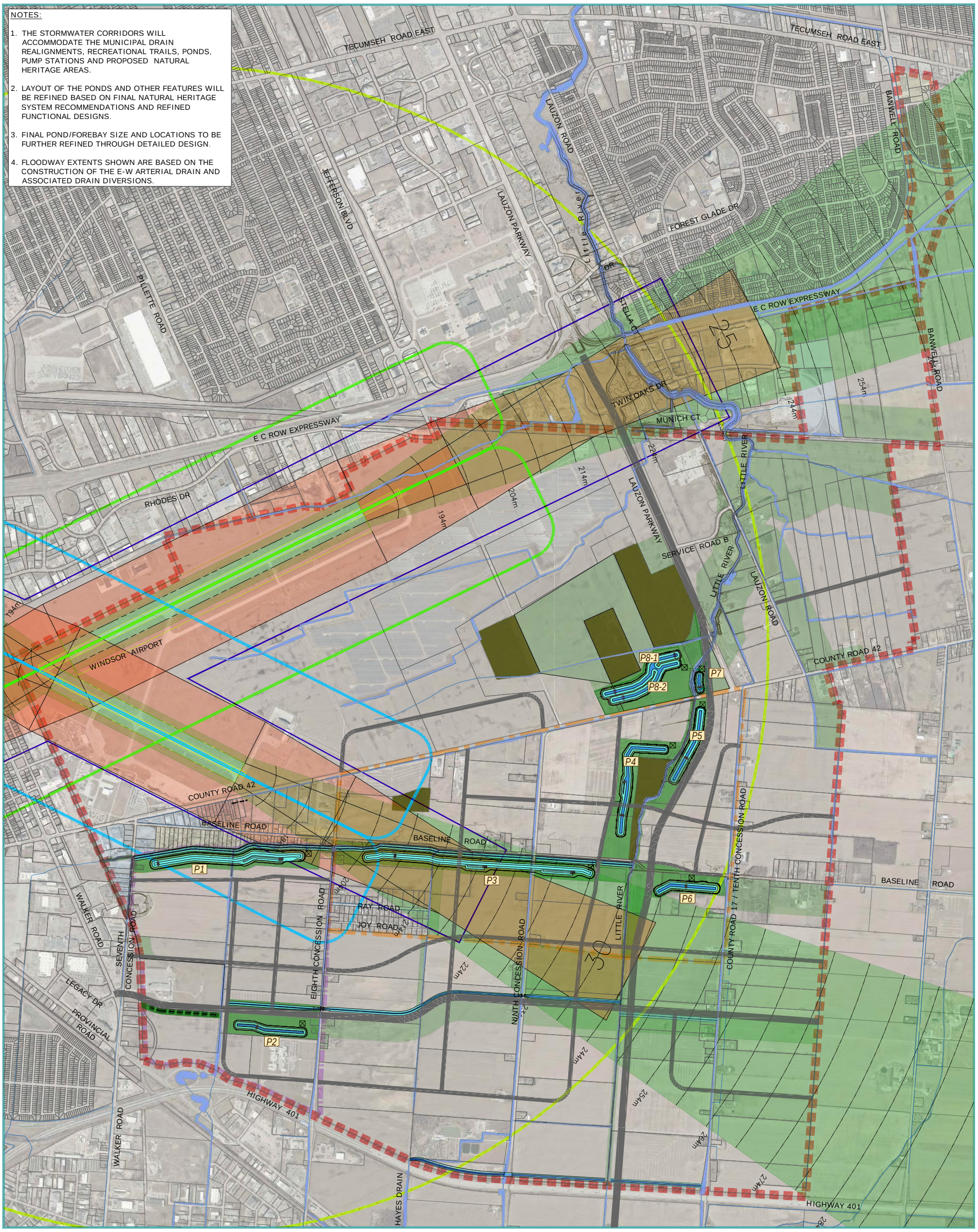
SCALE
0 2 10 25m

STATUS: FINAL PROJECT: 19-9817 DATE: March 27, 2023

File Location: c:\pw working directory\projects 2019\3210\dwg\dwg70974\19817-10-pic typ swm corridor xsections v2.dwg March 27, 2023 7:14 AM

NOTES:

1. THE STORMWATER CORRIDORS WILL ACCOMMODATE THE MUNICIPAL DRAIN REALIGNMENTS, RECREATIONAL TRAILS, PONDS, PUMP STATIONS AND PROPOSED NATURAL HERITAGE AREAS.
2. LAYOUT OF THE PONDS AND OTHER FEATURES WILL BE REFINED BASED ON FINAL NATURAL HERITAGE SYSTEM RECOMMENDATIONS AND REFINED FUNCTIONAL DESIGNS.
3. FINAL POND/FOREBAY SIZE AND LOCATIONS TO BE FURTHER REFINED THROUGH DETAILED DESIGN.
4. FLOODWAY EXTENTS SHOWN ARE BASED ON THE CONSTRUCTION OF THE E-W ARTERIAL DRAIN AND ASSOCIATED DRAIN DIVERSIONS.



SANDWICH SOUTH MASTER SERVICING PLAN

AIRPORT ZONE OVERLAY

FIGURE 3

- STUDY AREA
- EAST PELTON SPA
- CR42 SPA
- TRUNK STORM SEWER
- 1:100 YEAR FLOODWAY EXTENTS
- FUTURE COLLECTOR AND ARTERIAL ROADS
- NATURAL HERITAGE AREA
- P1 TYPICAL POND NAME
- OPEN SPACE / STORMWATER MANAGEMENT CORRIDOR
- PROPOSED STORM SEWER DRAINAGE
- STORMWATER PUMP STATION
- STORMWATER MANAGEMENT POND- PERMANENT POOL
- STORMWATER MANAGEMENT POND - ACTIVE STORAGE
- MUNICIPAL DRAIN RELOCATION OR NEW DRAIN

AIRPORT ZONES LEGEND

- 4 KM DIAMETER FROM AIRFIELD CENTRE (WILDLIFE CONTROL ZONE)
- TYPICAL TRAFFIC PATTERN (East-West)
- TYPICAL TRAFFIC PATTERN (North-South)
- OBSTACLE LIMITATION SURFACES (OLS)

THE CITY OF WINDSOR ONTARIO, CANADA

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY CITY OF WINDSOR 2019, MNRF 2019, TOWN OF TECUMSEH 2019, *ESSEX REGION CONSERVATION AUTHORITY 2019, **COUNTY OF ESSEX 2019

MAP CREATED BY: RBH
MAP CHECKED BY: LMH
MAP COORDINATE SYSTEM: NAD 1983 CSRS UTM Zone 17N

*DEM - CGVD28:78 DEM SURFACE DERIVED BY ERCA BASED ON MNRF LIDAR - DIGITAL TERRAIN MODEL (2016-18). COPYRIGHT ERCA, 2019. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO. (WWW.ONTARIO.CA/PAGE/OPEN-GOVERNMENT-LICENCE-ONTARIO)

**2019 IMAGERY - THE DIGITAL MAP LAYERS HAVE BEEN USED WITH EXPRESS PERMISSION OF THE CORPORATION OF THE COUNTY OF ESSEX

N W E S

SCALE: 1:12500
STATUS: FINAL
PROJECT: 19-9817

DATE: April 18, 2023

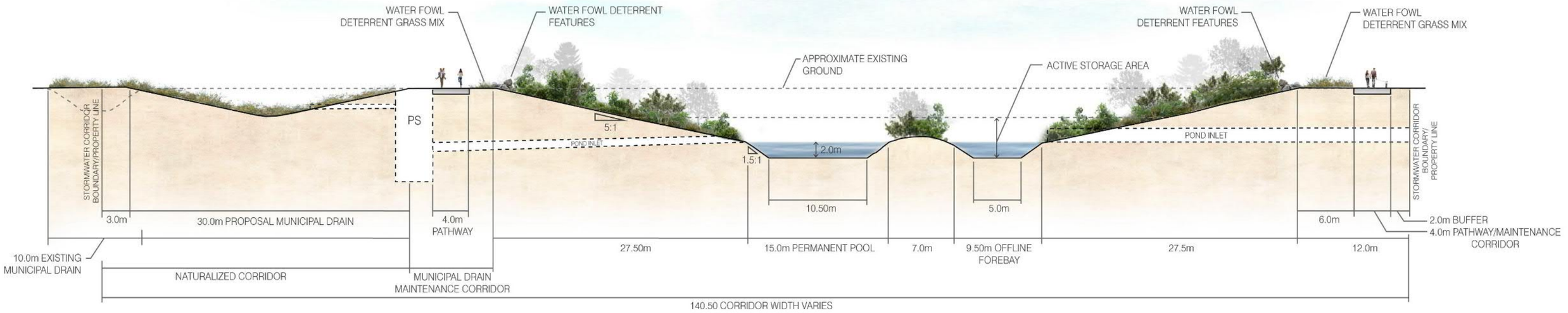
File Location: c:\pw working directory\projects 2019\32rbh\dms90713\199817-02-swm-ponds.dwg April, 18, 2023 1:00 PM

Attachment B

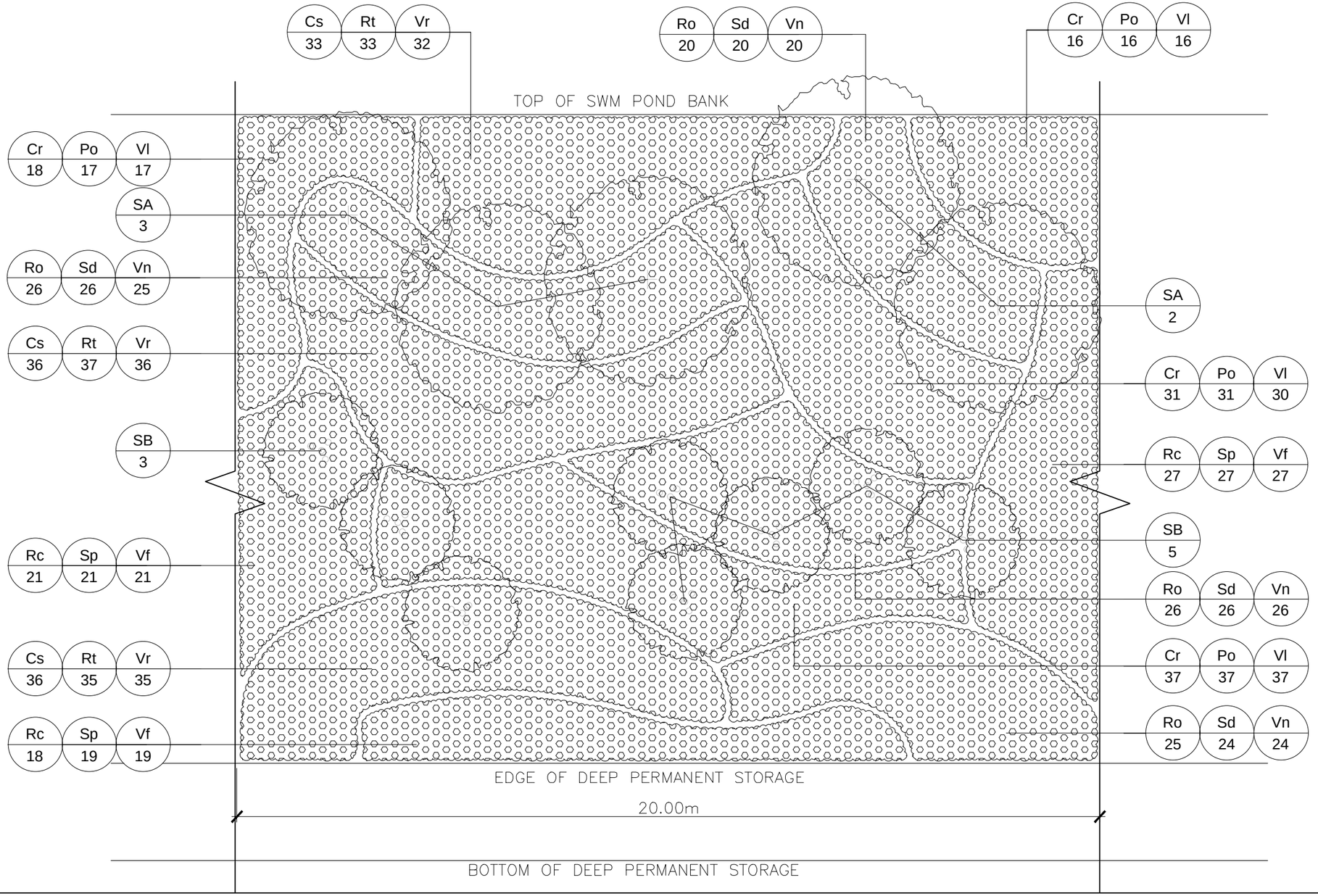
Landscaping Planting Plans and Approximate Costs, Cross-Section Renderings

DILLON
CONSULTING

Sandwich South Master Servicing Plan
Typical Stormwater Management Pond Cross Section



SEE FIGURE L2 FOR PLANTING DETAILS, PLANT SCHEDULE AND MAINTENANCE RECOMMENDATIONS



SANDWICH SOUTH MASTER SERVICING PLAN

SUPPLEMENTARY WATERFOWL ADAPTIVE MITIGATION PLAN FOR STORMWATER MANAGEMENT FACILITIES
20M SWM POND PLANTING CELL

FIGURE L1

Cr 16 — PLANT CODE / PLANT QUANTITY

PROPOSED SHRUBS

PROPOSED TREE

PROPOSED MULTI STEM TREE

THE CITY OF WINDSOR ONTARIO, CANADA

DILLON CONSULTING

0 1m 4m

SCALE 1:100

N W E S

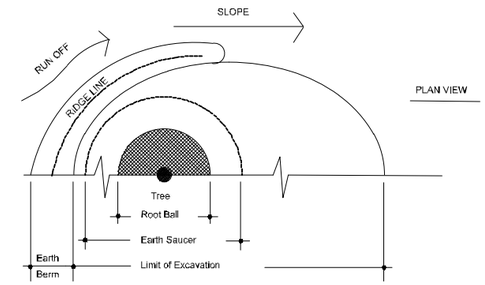
STATUS: FINAL

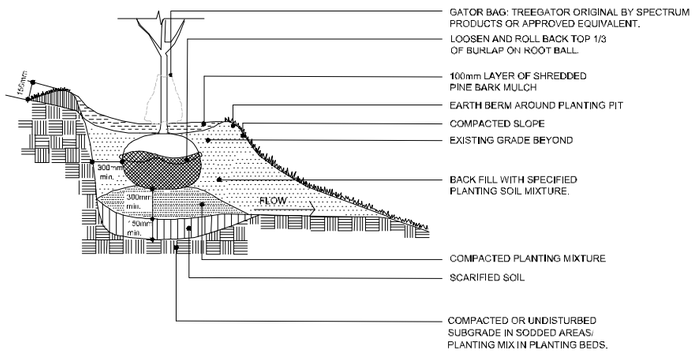
PROJECT: 19-9817

DATE: July 15, 2022

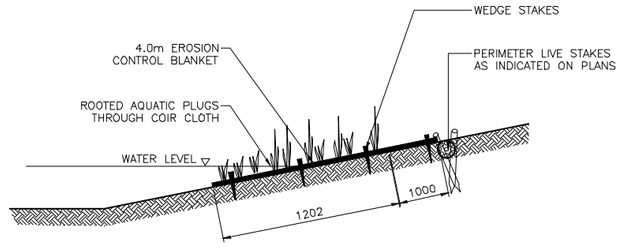
File Location: c:\pw working directory\projects 2019\20jtg\d0104858\199817-06-land-de.dwg July, 15, 2022 12:39 PM

PLOT DATE: 2022-07-15 @ 12:39:40 PM PLOT SCALE: 1:25.4 PLOT STYLE: DILLON-STD-HALF.CTB





1 L1 DECIDUOUS TREE PLANTING ON A SLOPE
NTS



NOTE:
CURLEX® NETFREE™ 100% BIODEGRADABLE EROSION CONTROL BLANKETS SHALL BE USED FOR ALL EROSION CONTROL.

2 L1 FLOOD FRINGE AQUATIC PLANTING
NTS

MASTER PLANT LIST

CODE	BOTANICAL NAME	COMMON NAME	QTY	SIZE	COND.	SPACING
MULTI-STEM TREES						
SA	Salix amygdaloides	PEACH-LEAVED WILLOW	5	35mm cal.	B.B.	4.0m O.C.
SB	Salix bebbiana	BEBB'S WILLOW	8	35mm cal.	B.B.	4.0m O.C.
DECIDUOUS SHRUBS						
Cr	Cornus racemosa	GRAY DOGWOOD	102	50cm ht.	3 gal.	0.5m O.C.
Cs	Cornus sericea	RED-OSIER DOGWOOD	105	50cm ht.	3 gal.	0.5m O.C.
Po	Physocarpus opulifolius	EASTERN NINEBARK	101	50cm ht.	3 gal.	0.5m O.C.
Rt	Rhus typhina	STAGHORN SUMAC	105	50cm ht.	3 gal.	0.5m O.C.
Rc	Rubus occidentalis	BLACK RASPBERRY	66	n/a	2 gal.	0.5m O.C
Ro	Rubus oderatus	FLOWERING RASPBERRY	97	n/a	2 gal.	0.5m O.C.
Sd	Salix discolor	PUSSY WILLOW	96	60cm ht.	3 gal.	0.5m O.C.
Sp	Spirea alba	MEADOWSWEET	67	n/a	2 gal.	0.5m O.C
Vl	Viburnum lentago	NANNYBERRY	100	50cm ht.	3 gal.	0.5m O.C.
Vn	Viburnum nudum	WILD RAISIN	95	n/a	2 gal.	0.5m O.C
Vf	Viburnum rafinesquianum	DOWNY ARROWWOOD	67	50cm ht.	3 gal.	0.5m O.C
Vr	Viburnum recognitum	SMOOTH ARROWWOOD	103	50cm ht.	3 gal.	0.5m O.C.

PLANTING NOTES:
1. PLANTINGS SHOULD BE AN ASYMMETRICAL, RANDOM MIX.
2. SPECIES SHOULD BE PLANTED TOGETHER IN GROUPS OF 5-7.
3. SEE INDIVIDUAL PLANT LISTS FOR RECOMMENDED PLANT SPACING.
4. ALL PLANT MATERIALS SHALL BE #1 NURSERY STOCK MEETING CANADIAN STANDARDS.
5. STAKE ALL DECIDUOUS TREES.
6. DIG ALL TREE PITS 500mm LARGER ALL AROUND THAN THE ROOT BALL AND PLACE TREE CENTRED IN PIT ON UNDISTURBED SOIL. BACKFILL WITH PARENT MATERIAL AND REPLACE DEBRIS (EG. BRICK, DRY WALL, ETC) WITH SCREENED TOPSOIL.
7. FOR GRADING AND DRAINAGE, SEE ENGINEERING PLANS.
8. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
9. ALL PLANT MATERIALS TO BE GUARANTEED FOR TWO GROWING SEASONS FROM THE DATE OF PROVISIONAL ACCEPTANCE.
10. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, ALL EXISTING UNDERGROUND UTILITIES WITHIN THE LIMITS OF THE CONSTRUCTION SITE SHALL BE LOCATED AND MARKED. ANY UTILITIES DAMAGES OR DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE OWNER AT NO ADDITIONAL COST.
11. PLANT MATERIALS TO BE INSTALLED AS SHOWN; SUBSTITUTIONS ALLOWED ONLY AFTER CONSULTATION WITH THE LANDSCAPE CONSULTANT.

MAINTENANCE NOTES:
1. MINIMUM MAINTENANCE REQUIREMENTS SHALL FOLLOW THE MOST CURRENT EDITIONS OF THE WINDSOR/ESSEX REGION STORMWATER MANAGEMENT STANDARDS MANUAL AND THE TRCA - INSPECTION AND MAINTENANCE GUIDE FOR STORMWATER MANAGEMENT PONDS AND CONSTRUCTED WETLANDS
2. MAINTENANCE SCHEDULE SHALL CONTINUE FOR A PERIOD OF NOT LESS THAN TWO (2) YEARS AFTER SUBSTANTIAL PERFORMANCE OF THE WORK HAS BEEN GRANTED.
3. VEGETATION SHALL BE INSPECTED AFTER EVERY SIGNIFICANT RAIN EVENT (I.E. 25 YEAR STORM OR GREATER) TO ENSURE SUFFICIENT FUNCTIONING OF THE POND.
4. PLANTED AREAS OF SWM PONDS SHALL BE INSPECTED AND HAVE WEEDS AND OTHER INVASIVE MATERIALS (i.e. Phragmites australis ssp. australis) REMOVED ON A MONTHLY BASIS.
5. SCHEDULE PHRAGMITES REMOVALS TO COINCIDE WITH ANY PLANNED SEDIMENT REMOVALS.
6. TRASH AND DEBRIS WITHIN THE SWM POND SHALL BE PROMPTLY REMOVED ON A WEEKLY BASIS.
7. IF OIL/SHEEN IS OBSERVED, IT SHOULD BE REMOVED IMMEDIATELY BY USE OF OIL-ABSORBENT PADS OR A PROFESSIONAL WITH A VACUUM TRUCK. SPECIAL DISPOSAL REQUIREMENTS MAY APPLY.
8. APPLY BARLEY STRAW ON THE DRY LAND SURROUNDING THE POND AT A RATE OF 1KG PER 1000m2 OF SWM POND AREA TO INHIBIT ALGAE GROWTH.
9. IF ALGAL MATTS DEVELOP OVER 10% OF THE WATER SURFACE OR MORE, THEY SHOULD BE REMOVED USING A RAKE AND DISPOSED OF OFF SITE. ALGAE SHOULD NOT BE LEFT ON SITE.
10. IF MOWING IS TO OCCUR NEAR THE SWM PONDS, CUT GRASS TO 4-6 INCHES IN HEIGHT, MINIMUM. COLLECT GRASS CUTTINGS AND REMOVE FROM SITE, DO NOT MULCH.
11. AVOID USE OF FERTILIZERS, PESTICIDES AND HERBICIDES IN OR NEAR SWM PONDS.

SANDWICH SOUTH MASTER SERVICING PLAN

SUPPLEMENTARY WATERFOWL ADAPTIVE MITIGATION PLAN FOR STORMWATER MANAGEMENT FACILITIES
20M SWM POND PLANTING CELL

FIGURE L2

Cr 16 PLANT CODE PLANT QUANTITY

PROPOSED SHRUBS

PROPOSED TREE

PROPOSED MULTI STEM TREE

THE CITY OF WINDSOR ONTARIO, CANADA

DILLON CONSULTING

N W E S

STATUS: FINAL PROJECT: 19-9817 DATE: July 15, 2022

File Location: c:\pw working directory\projects 2019\20jtg\d0104858\199817-06-land-de.dwg July, 15, 2022 12:39 PM

PLOT DATE: 2022-07-15 @ 12:39:41 PM PLOT SCALE: 1:25.4 PLOT STYLE: DILLON-STD-HALF.CTB

City of Windsor

South Sandwich SWM Pond planting cell (20mx15m)

Dillon Consulting
13/04/2022

Opinion of Probable Costs

ITEM	DESCRIPTION	UNIT	EST. QTY	UNIT COST	ITEM COST
OPINION OF PROBABLE COSTS					
1.0	**Plantings**				
1.1	Planting medium to 300mm depth	m2	300	$ 50.00	$ 15,000.00
1.2	Fine grading	m2	300	$ 5.00	$ 1,500.00
1.3	**Trees (35mm Cal. B.B.)**				
1.3.1	Salix amygdaloides	Ea.	5	$ 550.00	$ 2,750.00
1.3.2	Salix bebbiana	Ea.	8	$ 550.00	$ 4,400.00
1.4	**Shrubs (50mm ht. 3 gal)**				
	Cornus racemosa	Ea.	102	$ 30.00	$ 3,060.00
	Cornus sericea	Ea.	105	$ 27.00	$ 2,835.00
	Physocarpus opulifolius	Ea.	101	$ 30.00	$ 3,030.00
	Rhus typhina	Ea.	105	$ 27.00	$ 2,835.00
	Salix discolor	Ea.	96	$ 27.00	$ 2,592.00
	Viburnum lentago	Ea.	100	$ 30.00	$ 3,000.00
	Viburnum rafinesquianum	Ea.	67	$ 30.00	$ 2,010.00
	Viburnum recognitum	Ea.	103	$ 30.00	$ 3,090.00
1.5	**Shrubs (2 gal.)**				
	Rubus occidentalis	Ea.	66	$ 24.00	$ 1,584.00
	Rubus oderatus	Ea.	97	$ 24.00	$ 2,328.00
	Spirea alba	Ea.	67	$ 25.00	$ 1,675.00
	Viburnum nudum	Ea.	95	$ 42.00	$ 3,990.00
				Estimated Construction Development Costs	**$ 55,679.00**
				10% Contingency	**$ 5,567.90**
				Total Costs including 10% Contingency	$ 61,246.90

Attachment C

Example Pulley and Cable System

DILLON
CONSULTING

Stantec

CITY OF OTTAWA
GULL MANAGEMENT FACILITIES
(MOONEY'S BAY & BRITANNIA BEACH)

OPERATIONS & MAINTENANCE MANUAL

Prepared for:

City of Ottawa
Surface Operations Branch

Prepared by:

Stantec Consulting Ltd.
1505 Laperrière Avenue
Ottawa, Ontario, K1Z 7T1

October 2003

TABLE OF CONTENTS

1. INTRODUCTION

The beaches of the City of Ottawa have been subject to closures over the years due to higher than accepted pollution counts. One of the main sources of pollution has been bird droppings - specifically gull droppings.

From studies and monitoring, it has been shown that gulls tend to assemble and occupy areas adjacent to beaches and parks, places where people tend to gather and discard residual foodstuffs, and upon flight takeoffs, defecate over the beach or water depositing the source of pollution. It became necessary to find how to eliminate or at least minimize this source of pollution.

From research, it was found that the congregation of gulls at beaches, and thus their droppings, could be controlled. The main controlling device was a series of parallel overhead monofilament lines strung over an area of beach/water, which deterred the gulls from over flying the protected area.

The task then became the design and implementation of this type of facility at Ottawa's beaches. This has come to be called "Gull Management Facility" or its acronym "GMF".

In the early 1990's, a rectangular system of gull wiring, approximately 26,000 m^2 (400m x 65 m), was erected over the beach at Mooney's Bay covering a strip of beach and swimming area. Between the late 1990's and 2002, an "L" shaped system of gull wiring, approximately 22,000 m^2 was erected over the beach and swimming area at Britannia Beach with a possible future extension of 5,000 m^2. The results of these two installations have been lower pollution counts, fewer beach closures and a greater use of these two beaches.

Due to river flow and ice conditions and bird migration habits, there are only a few days when the water based poles and wiring can be installed and removed. They must be installed after the spring freshet and removed in late summer before the fall bird migration. Installation and disassembly of the system, together with the in-use conditions, causes wear-and-tear on the system. This creates the need for a maintenance program to ensure all components of the system are available at time of reinstatement and that the system components are in good working order. This cyclic installation and removal of the system creates the need for an operations program to ensure the system components are stored systematically and contractors are retained and scheduled to install and disassemble the facilities.

This operations and maintenance manual is intended to be a guide to describe and maintain the components and the annual operations of the facilities in detail

and be in the possession of the City staff who is responsible for the maintenance and operations of the gull management facilities.

2. PURPOSE

The purpose of the gull management facilities is to deter gulls from polluting the bathing areas at City beaches. The overhead monofilament wiring interferes with gulls that are flying in the area and they shortly avoid the area. This Manual provides direction to City staff and contractors about the operations associated with the implementation, maintenance and storage of the various components of the GMF systems, including drawings describing the GMFs and the work involved in repairing, installing and removing them.

Planning for the installation each year must start before spring to allow time for contracts to be awarded, procurement of wiring and repair of damaged poles, cables and footings.

3. RESPONSIBILITIES OF CITY STAFF

3.1. Mooney's Bay

There are only a few days in April when river levels are low enough to install the poles in dry working conditions and the earliest date varies from year to year, depending on the time and duration of the spring freshet. Starting the beginning of April, inspect the foundation location every few days. When they are above the water level, start installing the poles. Parks Canada usually starts the installation of the stop logs at Hog's Back Dam the last Monday in April, so the water level is raised to the summer level over the next few days. Pole installation must be completed by this time, if it is to be done in dry working conditions. If the work is not done by this time, the remaining poles will have to be installed underwater using qualified divers and a barge.

3.2. Britannia Beach

The pole foundations are always under water. There are only a few weeks in April and May when river levels are low enough to install poles without problems with high water and ice. The earliest date varies from year to year, depending on the time and duration of the spring freshet. Starting in mid-April, check the water level every few days. Generally, there are two peaks, the second one occurring in May. When it appears that the water level is low enough, pole installation should begin.

3.3. Both Beaches

The wires must be installed by the first weekend in June, when the beach is first opened. Contact the Area Manager in the Community Services Branch for further information. It is efficient to coordinate the installation of the GMF system(s) with the installation of the beach buoy lines.

3.4. Removal

There are only a few days in late summer to complete the removal of the wiring. Generally, the beaches are closed the third week in August, but continue to be used until Labour Day. Start the removal immediately after this date. The wiring must be completely removed by September 9, when the fall bird migration starts. If the wiring is not completely removed by this date, migrating birds will likely become entangled and killed, which may jeopardize the overhead wiring program. The poles should be removed by mid-November to avoid being frozen in place. If this occurs, the remaining poles will likely be damaged by ice during the spring freshet.

As indicated earlier, the GMF components are erected and installed in the spring and disassembled and taken down and stored in late summer. Actual dates will be determined by the City staff responsible for the organization of the actions associated with the operations and maintenance of the facilities. These actions require planning and scheduling to implement on time and within budget.

The sequence of events required each year include:

1. Solicit quotations from interested and experienced contractors to erect/install and disassemble/takedown including loading at and transporting from storage site and transporting to and offloading at storage site. Request for quotation should include erection/installation and disassembly/takedown approximate dates.
2. Evaluate quotations and experience of contractors and select a contractor.
3. Coordinate and assist contractor with his tasks at storage site.
4. Monitor installation, in-use period and takedown operations. Arrange for removal, disposal and reinstatement of ruptured monofilament during in use period.
5. Should a bird become entangled in the wires, it is imperative that it be IMMEDIATELY removed and disposed of. Failure to remove entangled birds will result in substantial negative public relations. This is the responsibility of the Zone Supervisor(s) in Surface Operations.

6. Upon takedown and return to storage area dispose of all monofilament and procure and identify new monofilament in accordance with the tables of monofilament lengths appended to this manual. Closely inspect the condition of all steel components returned to storage and repair as required. Repairs will typically include cleaning corrosion by wire brush or mechanical grinding and touching up exposed area with a durable zinc coating.
7. Procure all other components and materials that have worn out or reached the end of their useful life.
8. Place all components and materials clearly identified and carefully protected in the storage area.

The individual facilities and their installation and dismantling details are described in the following sections of this manual and are separated according to the beach location.

Specifications and erection/installation and dismantling/storage procedures are described in subsequent sections of this manual and separate attachments of these will be provided for inclusion in the "Request for Quotation" packages.

4. DESCRIPTION OF THE SYSTEM

This section describes the component parts of the gull management systems at each location.

4.1. Mooney's Bay

This facility covers approximately 26,000 m^2 of beach and swimming area and consists of seven panels of monofilament in a 425m long by 70m wide rectangular configuration supported by sixteen poles, seven poles situated in the water and nine poles situated on land (see Figure A1 in Appendix A). Approximately 25m of beach and 45m of water are covered.

Each pole is approximately eight meters high and supported in a concrete base (see Figure A4). The onshore poles remain in place year around and are bolted to the concrete bases. The offshore poles are supported in sleeves in the concrete bases.

Each panel consists of four poles laid out in a roughly rectangular footprint. Each pair of poles support parallel 4.8mm diameter stainless steel cables, which in turn support monofilaments (40 lb test fishing line) spaced at approximately 3m intervals along the cables. Each panel of stainless steel cables and monofilament is independent from adjacent panels except for the common poles they share.

Each stainless steel cable is attached at its north end to a fixed eyestrap with a carbine hook, with no adjustment capability (see Figure A4). The cable runs up the pole through a boom bail and crosses to the next pole south, through a boom bail and down the pole and is attached to a 'T' track assembly that is adjustable to increase or decrease cable tension and sag in the system. Attached to the cables at specified intervals (nominally 3m) are pairs of retaining rings with swivel clips to attach the ends of the monofilament. The retaining rings allow the swivel clips to move freely around the cable without allowing the monofilament to slide along the cable.

The monofilaments are cut in lengths to the nearest centimeter (held tight but not over-stretched) with brass fishing leaders at each end to connect to the swivel clips. The lengths of the monofilament are important in order to maintain equal tension in each monofilament and thus each monofilament has an alphanumeric identification and specified location along the cable (see Figure A3).

4.2. Britannia Beach

This facility covers approximately 22,000m^2 of beach and swimming area and consists of five panels of monofilament in an "L" shaped configuration supported by twelve poles, five poles situated in the water and seven poles situated on land. The policy has been to leave the seven land-based poles in place all year and only remove, store and reinstate the five water-based poles, including the "boot" at pole location P3. The "boot" is described in the next paragraph. The water-based poles are removed to prevent damage from ice (see Figure B1 in Appendix B).

All poles with the exception of P1 are supported by approximately 1200mm diameter concrete caissons of variable length (see Figure B2). Steel sleeves, 900 mm deep, are embedded in the top of the caissons to receive the poles. At pole location P1 a 2000 mm deep steel sleeve is embedded into bedrock. At pole location P3, because of an inaccuracy in setting the sleeve, a "boot" was fabricated to rectify the non-plumb position of the sleeve (see Figure B3). This "boot" consists of an upper and lower section. The sections are not co-linear by design. The upper section, of similar diameter as the sleeve in the caisson, receives the pole while the lower section, of similar diameter as the pole fits into the sleeve. Orientation of the "boot" is critical to ensure pole is plumb.

The sleeve openings in the five water-based pole locations are covered with a steel cover plate with handle and neoprene gasket when the poles are not in place. Location of water-based poles is normally found using

metal detectors. Inserted at the bottom of the sleeves are "sleeve inserts" needed to receive the "pole tip assembly" to concentrically position the base of the poles due to the difference in the inside diameter of the sleeve and the outside diameter of the pole. These can remain in place in the off-season.

The pole is concentrically positioned at the top of the sleeve with the adjustable "ring flange/wedge assembly" (see Figure B2 & B3). These components at the water-based pole locations must also be removed, stored and reinstated with the poles. The "sleeve inserts" and "pole tip assemblies" are in place at all land-based poles. The various terms for the components are described and detailed on the drawings that form part of this manual.

The poles are fabricated from variable height DN200 STD Pipe lower section with 3.5m height DN150 STD Pipe upper section to provide approximate clearances of 9m above average summer water levels and beach. Some components are attached to the poles to facilitate lifting the poles and stringing the cables that support the monofilament. These attachments include the "halo assembly" to attach the pulley block and tackles to, lift lugs to facilitate lifting the pole and T-tracks, sliders and eyestraps to secure fixed and tensioning ends of the cables. Carbine hooks at ends of cable permit securing the cables to the poles and fastening clips and stop clips on the cables permit securing the ends of the monofilament to the cables using fishing line leaders.

5. ERECTION OF THE SYSTEM

Both systems have their similarities and differences. One major difference is the considerably heavier poles at Britannia Beach. Another major difference results from the lowered water level of the Rideau River from late Fall to mid Spring which leaves the water based pole foundations at Mooney's Bay Beach in the dry. Typically, at both locations, the land based poles are left in place and the water based poles are removed and stored over the winter.

Refer to drawings included in Appendix A (Mooney's Bay) or Appendix B (Britannia Beach) in conjunction with the procedures outlined below.

5.1. Mooney's Bay

First locate the concrete foundations for the seven offshore poles. With the lowered water level comes the opportunity to inspect the exposed areas of the concrete caissons and repair any conditions that may be deemed detrimental to the durability and/or functioning of the system.

Having located all pole foundations, remove the steel covers for storage during beach season, and thoroughly clean out each of the steel sleeves. Each of the poles should be rigged with 6mm rope passing through the boom rails prior to erection. This rope will later be attached to the cables and used to erect the wiring (see Figure A4 in Appendix A). The poles can then be inserted into corresponding sleeves using appropriate lifting equipment (pole OS7 weighs approximately 150kg). Note that not all of the poles are identical – pole OS1 requires a "steel sleeve adapter" which should be installed directly into the foundation sleeve (see Figure A2). Also the poles at OS1 and OS7 are steel, whereas poles at locations OS2 to OS6 are aluminum. Poles should be oriented in the sleeves such that the T-tracks and sliders are on the north side of the pole.

The next stage is the connection of monofilaments to the cables. New monofilament line should be procured and used each year, and should be 178N (40lb) "Berkley XT" type. Cables should be laid out on the beach in their approximate locations, and the fastening clips, stop clips, and fishing line leaders attached as shown on Figure A4. Monofilaments should be cut to the lengths shown on Figure A3 – it may be easier to pre-measure and label monofilaments prior to arrival at the site. Care is needed to ensure that monofilament lines do not become entangled or break.

The system is best installed one bay at a time, starting at the ends (Bays 'A and 'G') and working towards the central bay (Bay 'D'). Attach the rope through boom rails to each end of the cable, and slowly raise the cable sufficiently that the carbine hook can be attached to the eyestrap on the "fixed" pole (the eyestrap should be on the south side of each pole, so the north end of the cable is raised first). The rope attached to this end can then be removed. The rope on the opposite end of the cable is then used to raise the system into position, using the sliders and micro-track assemblies attached to each of the poles to tension the cable and secure it in position. This process is then repeated for each of the bays. Final adjustment may be required to ensure sufficient tension in each of the cables.

Following installation any debris should be removed, and the beach area left in a clean and safe condition.

5.2. Britannia Beach

Unlike Mooney's Bay Beach, the water-based poles at Britannia Beach are permanently under 1.5m to 3.0m of water and must be located each spring. Locating the foundations is done by coordinated survey directing divers with metal detection devices. Further research is also being conducted to

install "homing" devices in the sleeves of the foundations to facilitate the locating of the foundations.

Once located, remove the steel covers for storage during the beach season and clean out the sleeves. Four of the five water based pole foundations, P1, P5, P7 and P9, are similar. Pole foundation P3 is different as a result of an undetected movement of the steel sleeve at the time concrete was being placed in the caisson. To remedy the out of plumb sleeve, a sleeve adaptor or "boot" as it has been termed, was designed and fabricated to insert into the caisson sleeve (see Figure B3 in Appendix B). The "boot" consists of a lower piston that is inserted into the caisson sleeve and an upper sleeve into which the pole is inserted. The alignment of the lower piston and upper sleeve is designed to offset the tilt in the caisson sleeve and the orientation of the "boot" is key. For quality control of the placement of the "boot", it will be required to position the "boot" using a level to ensure it is plumb and then score the "boot" flange and top of caisson with markings which can simply be aligned at subsequent installations.

It should be noted that correct positioning and alignment of the "boot" at this point is critical to ensure that the pole can be installed vertical and the system rigged correctly.

Poles should be rigged with rope through the pulleys attached to the halos prior to erection (see Figure B5). Erect the poles, which are identified, at their respective locations using a barge with lifting device on board. Use of mechanical land equipment that could leak oil or gas into the water is strictly prohibited.

Procure new monofilament, cut to specified lengths and fit ends with fishing line leaders and identify line in accordance with the Tables shown on Figure B4 in Appendix B.

Lay out cables, which are identified as to location, on the beach, attach the fastening clips and stop clips at the specified intervals along the cable and attach the pre-measured monofilament, to the cables with fishing line leaders. Pull the assembly between the pairs of poles and attach cable ends to the suspended ropes and hoist into position. One end of each cable is tied off at the eye strap and the other end is tensioned to the correct elevation and horizontal sag at the slider in T-track. These locations are designated "E" and "S", respectively, in Figure B5 in Appendix B. This procedure is repeated at each bay.

6. DISMANTLING THE SYSTEM

The GMF systems should be dismantled at each location according to the following procedures. Note that the timing of dismantling the wiring is critical (see section 3.4).

6.1. Mooney's Bay

The system is dismantled one bay at a time, starting at the central bay (Bay 'D') and working towards the end bays.

- Lower each cable to the slackest setting on the sliders.
- Attach the rope to the adjustable cable ends and lower the bay to working height.
- Lower the fixed end in a similar fashion.
- Detach the monofilament ends and clips.
- Lower, detach and label the cables.
- Inspect and report any damage to all hardware.
- Remove and label the offshore poles and the steel insert from footing OS1.
- Store the poles at the Mooney's Bay Beach confection area, as directed by the Zone Supervisor.

6.2. Britannia Beach

The system is dismantled one bay at a time in the reverse order it was erected.

- Tie ropes to each end of the cables and lower the cables.
- Detach the monofilament and clips from the cables.
- Inspect the clips and cable for damage and discard the monofilament. Damaged clips, cable and monofilament should be procured and stored for the following season's installation.
- Identify undamaged cables and store.
- Remove the offshore poles using the same methods used to erect them. Remove the "boot" at P3.
- Retrieve from storage and place steel covers over the caisson sleeve openings.
- Transport poles, boot, cables, etc., to the City of Ottawa's Swansea Road Yard for storage.
- Inspect poles for damage and make necessary repairs to the poles in conditions suitable for the type of repair required.

7. CONTACTS

GMF Operation & Maintenance and Beach Maintenance:

Jean Demers, Zone Supervisor (Surface Operations)
City of Ottawa,
1595 Telesat Court,
Gloucester, ON, K1B 1B6
Tel: 580-2424 ext. 12067,
Cell: 720-9045.

Beach Operation:

Judy Bates, Area Manager (Community Services Branch)
City of Ottawa,
495 Richmond Road,
Ottawa, ON, K2A 4B2
Tel: 724-4199 ext. 23166

Bathing Area Water Quality:

Martha Robinson, Environmental Health Analyst (Health and Long Term Care)
City of Ottawa,
495 Richmond Road,
Ottawa, ON, K2A 4B2
Tel: 724-4122 ext. 23658

River Water Quality:

Jane Scott, Program Manager (Water Environment Protection Program)
City of Ottawa Utility Services,
800 Green Creek Drive,
Gloucester, ON, K1J 1A6
Tel: 580-2424 ext. 22857

APPENDIX A

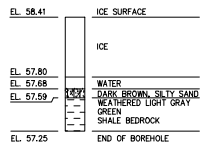
DRAWINGS – MOONEY'S BAY GMF

Figure A1 – General Arrangement

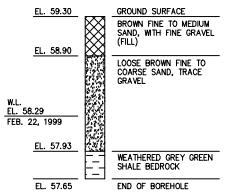
Figure A2 – Offshore Pole Installation Details

Figure A3 – Monofilament Arrangement

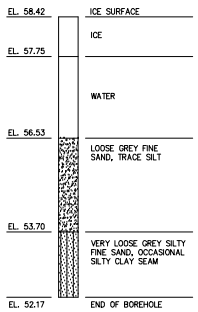
Figure A4 – Cable Installation Details



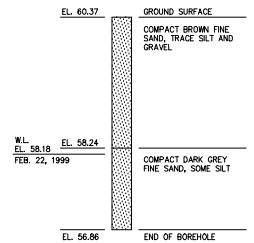
BOREHOLE NO.99-1
N.T.S.



BOREHOLE NO.99-2
N.T.S.



BOREHOLE NO.99-3
N.T.S.



BOREHOLE NO.99-4
N.T.S.

NOTE: THE ABOVE CONDITIONS EXISTED ON FEBRUARY 22 AND 23, 1999.

SITE PLAN
1:500

Stantec Consulting Ltd.
400 – 1505 Laperriere
Ottawa ON Canada
K1Z 7T1
Tel. (613) 722-4420
Fax. (613) 722-2790
www.stantec.com

Stantec

General Notes

1. THE SUCCESSFUL TENDERER SHALL BE REQUIRED TO PROVIDE DOCUMENTATION DEMONSTRATING EXPERIENCE IN THIS TYPE OF WORK.
2. THE SITE CONDITIONS AND ICE THICKNESSES GIVEN IN THE BOREHOLE LOGS EXISTED ON FEBRUARY 22 AND 23, 1999. THE CONTRACTOR SHOULD NOT EXPECT THAT CONDITIONS WILL BE SIMILAR AT THE TIME THE WORK IS DONE.
3. THE CONTRACTOR SHALL VERIFY THE CONDITIONS AT THE TIME OF CONSTRUCTION AND MAKE WHATEVER MODIFICATIONS ARE REQUIRED TO UNDERTAKE THE WORK IN THE WATER. IN THE EVENT THE ICE IS DEEMED UNACCEPTABLE TO SUPPORT THE CONSTRUCTION EQUIPMENT IT MAY BE PERMISSIBLE TO DELAY THE WORK IN THE WATER UNTIL SUCH TIME WHEN A BARGE COULD BE USED TO CONVEY THE CONSTRUCTION EQUIPMENT TO THE WATER LOCATIONS.

Construction Notes

1. THE FOLLOWING SUGGESTIONS ARE MADE FOR INFORMATION PURPOSES ONLY.
2. AT FOUNDATION LOCATIONS P3 AND P4, STEEL LINERS SHALL BE DRIVEN A MINIMUM 1 METRE BELOW THE SPECIFIED BOTTOM OF CAISSONS AND SHOULD EXTEND ABOVE THE ICE/GROUND LEVEL AT LOCATIONS P3 AND P4, RESPECTIVELY. MATERIAL SHALL BE EXCAVATED TO THE SPECIFIED BOTTOM OF CAISSONS AND SONOTUBE FORMS INSTALLED. SET AND SECURE THE REINFORCING STEEL AND STEEL SLEEVE ASSEMBLY. PLACE CONCRETE BY TREMIE METHOD AND EXTRACT STEEL LINER. CUT-OFF SONOTUBE FORM AT TOP OF CAISSON LEVEL. COVER HOLE WITH STEEL PLATE AND NEOPRENE GASKET.
3. AT FOUNDATION LOCATION P2, EXCAVATE TO APPROVED ROCK SURFACE. PLACE SAND BAG BERM AND REMOVE WATER. DRILL 37mm DIA. HOLES TO A MINIMUM 800mm DEPTH AND SET BENT 30M DOWELS WITH SPIRAL TIE A MINIMUM 750mm EMBEDMENT AND GROUT USING A NON-SHRINK GROUT SUCH AS SIKA 212 OR APPROVED EQUAL. SET SONOTUBE FORM AND STEEL SLEEVE ASSEMBLY AND PLACE CONCRETE IN THE DRY TO THE SPECIFIED LEVEL. COVER WITH STEEL PLATE AND NEOPRENE GASKET.
4. AT FOUNDATION LOCATION P1, CORE DRILL THE ROCK TO THE SPECIFIED DEPTH. GROUT THE STEEL SLEEVE WITH A NON-SHRINK GROUT SUCH AS SIKA 212 OR APPROVED EQUAL. PLACE GROUT LEVELING PAD ON ROCK SURFACE TO THE TOP OF SLEEVE FLANGE PLATE. COVER HOLE WITH STEEL PLATE AND NEOPRENE GASKET.
5. PLUMBNESS OF FOUNDATIONS, THE SLEEVES IN PARTICULAR, IS OF PRIME IMPORTANCE AND NO TOLERANCE IS SPECIFIED OR PERMISSIBLE.
6. CONTRACTOR SHALL SUBMIT PROPOSED CONSTRUCTION PROCEDURES TO THE ENGINEER FOR REVIEW.

Revision	By	Appd.	Date
0 ISSUED FOR TENDER	G.A.M.		99.02.26

Issued	By	Appd.	Date
File Name: 6862-001.DWG	T.J.N. Dwn.	G.A.M. Chkd.	G.A.M. Dsgn.	99.02.26 Date

Permit/Seal

REGISTERED PROFESSIONAL ENGINEER
G.J.A.McROBIE
PROVINCE OF ONTARIO

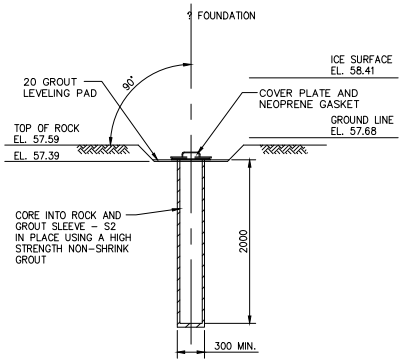
Client/Project

BRITANNIA BEACH
GULL MANAGEMENT FACILITY
Ottawa, Ontario

Title

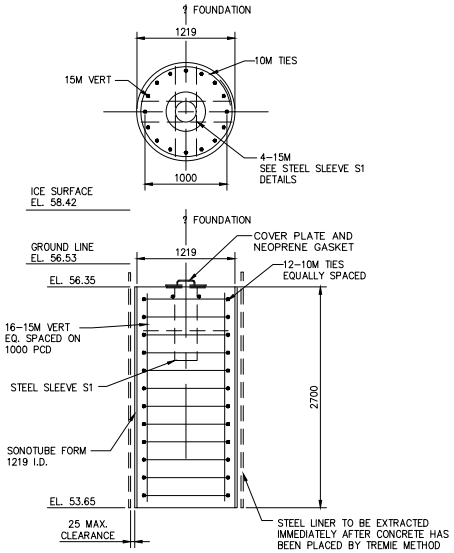
PHASE 1 - FOUNDATIONS
GENERAL ARRANGMENT

Project No.	Scale	
S6862	AS SHOWN	
Drawing No.	Sheet	Revision
6862-P1-001	1 of 2	0



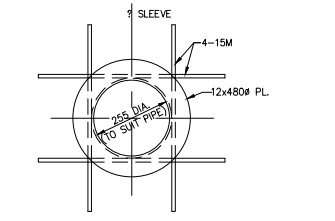
FOUNDATION P1

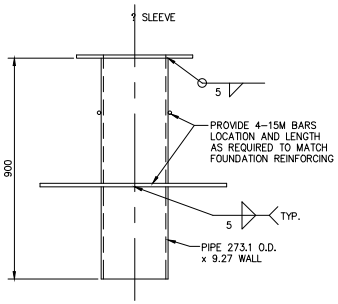
1:30



FOUNDATION P3

1:30

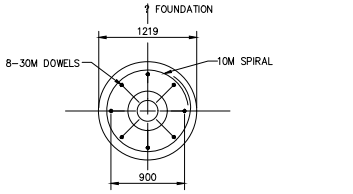


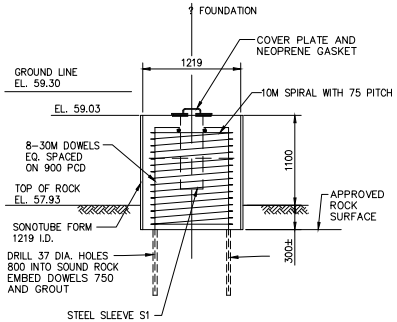


STEEL SLEEVE - S1

1:10

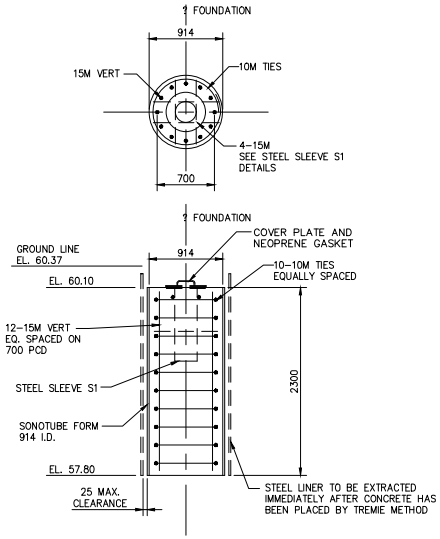
(3 REQUIRED)





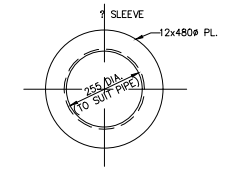
FOUNDATION P2

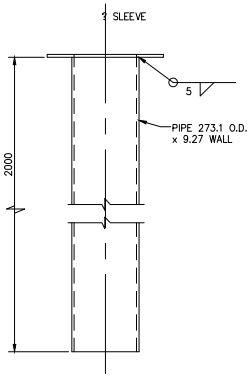
1:30



FOUNDATION P4

1:30

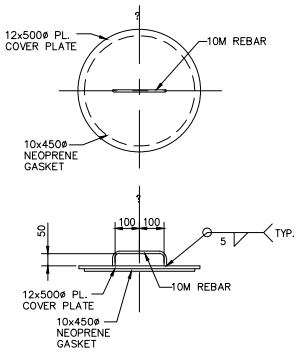




STEEL SLEEVE - S2

1:10

(1 REQUIRED)



COVER PLATE AND NEOPRENE GASKET

1:10

(4 OF EACH REQUIRED)

Stantec Consulting Ltd.
400 – 1505 Laperriere
Ottawa ON Canada
K1Z 7T1
Tel. (613) 722-4420
Fax. (613) 722-2790
www.stantec.com

Stantec

Consultants

Legend

Notes

1. CLASS OF CONCRETE SHALL BE 30 MPa.
2. REINFORCING STEEL SHALL BE GRADE 400.
3. CLEAR COVER TO REINFORCING STEEL SHALL BE 100mm ± 20mm
4. STEEL SLEEVE S2 AND DOWELS SHALL BE GROUTED IN PLACE USING A NON-SHRINK HIGH STRENGTH GROUT SUCH AS SIKA 212 OR APPROVED EQUAL.
5. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
6. SLEEVES SHALL BE STEEL PIPE SECTIONS TO ASTM A53, GRADE 240 (Fy = 240 MPa) ALL REMAINING STEEL SHALL BE IN ACCORDANCE WITH CAN/CSA G40.21 M92, GRADE 260W OR APPROVED EQUAL.
7. WELDING SHALL BE IN ACCORDANCE WITH CSA STANDARD W59, LATEST EDITION.

Revision	By	Appd.	Date
0 ISSUED FOR TENDER	G.A.M.		99.02.26
Issued	By	Appd.	Date
File Name: 6862-002.DWG	T.J.N. Dwn.	G.A.M. Chkd.	G.A.M. Dsgn.	99.02.26 Date

Permit/Seal

REGISTERED PROFESSIONAL ENGINEER
G.A.McROBIE
PROVINCE OF ONTARIO

Client/Project

BRITANNIA BEACH
GULL MANAGEMENT FACILITY
Ottawa, Ontario

Title

PHASE 1 - FOUNDATIONS
DETAILS

Project No.	Scale	
S6862	AS SHOWN	
Drawing No.	Sheet	Revision
6862-P1-002	2 of 2	0

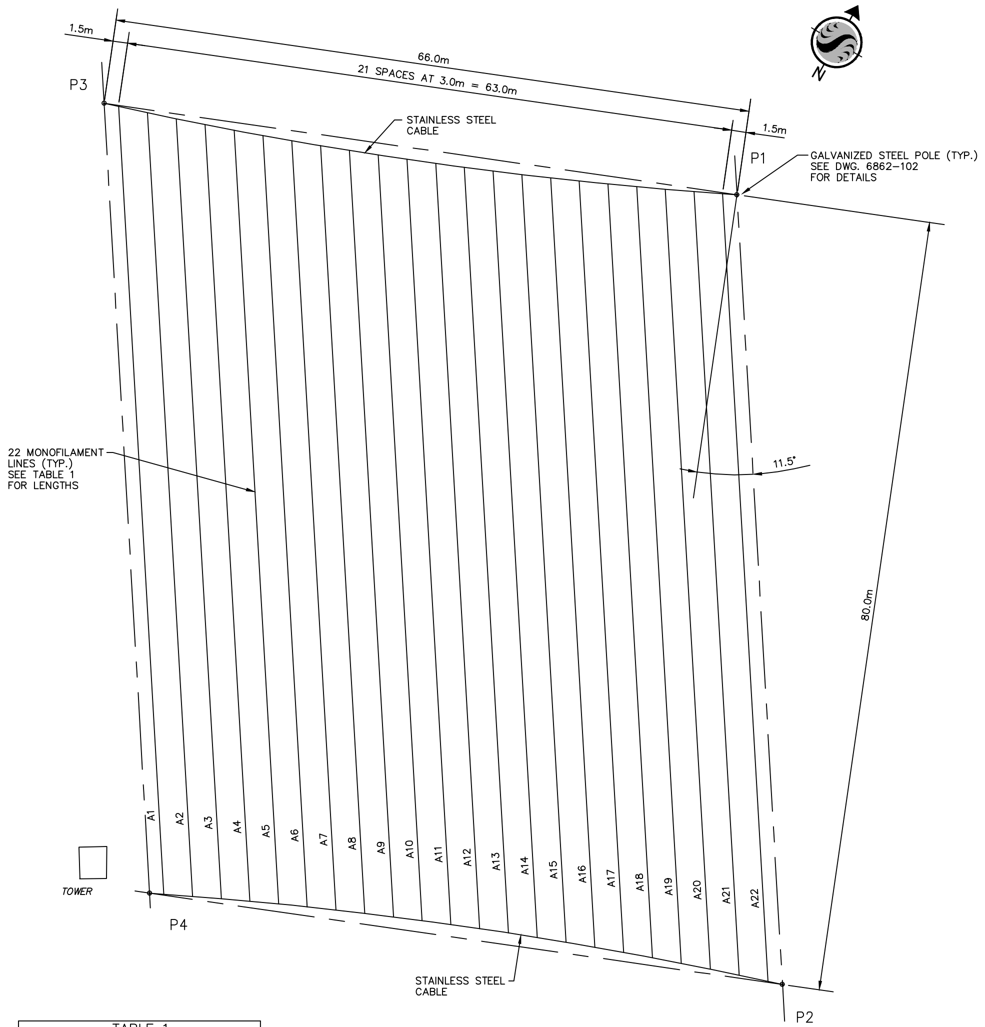
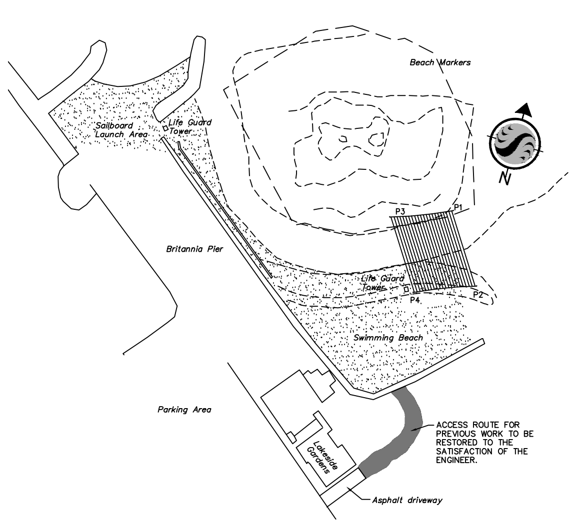


TABLE 1	
MONOFILAMENT NO.	LENGTH (m)
A1	81.635
A2	81.585
A3	81.487
A4	81.337
A5	81.139
A6	80.891
A7	80.593
A8	80.247
A9	79.849
A10	79.403
A11	78.907
A12	78.907
A13	79.403
A14	79.849
A15	80.247
A16	80.593
A17	80.891
A18	81.139
A19	81.337
A20	81.487
A21	81.585
A22	81.635

MESH LAYOUT

1:250

NOTE: REFER TO DRAWINGS 6826-P1-001 AND 002 FOR DETAILS AND LOCATION OF FOUNDATIONS.



SITE PLAN

N.T.S.

SCOPE OF WORK

1. LOCATE POLE FOUNDATIONS WITH THE USE OF A METAL DETECTOR. (THE ENGINEER WILL PROVIDE APPROXIMATE LOCATIONS.) REMOVE SAND BAGS AND STEEL COVERS, ENSURE SLEEVES ARE COMPLETELY CLEAN OF SILT, SAND, DEBRIS, ETC PRIOR TO INSTALLATION OF SLEEVE INSERTS AND POLES. STEEL COVERS SHALL BE STORED FOR REUSE UPON DISASSEMBLY OF OVERHEAD WIRING SYSTEM AND REMOVAL OF POLES IN THE FALL AT THE DIRECTION OF THE CITY.
2. SUPPLY, FABRICATION GALVANIZING AND INSTALLATION OF POLES P1, P2, P3 AND P4 C/W ALL ATTACHED PLATES, STIFFENERS, AND SLIDE-ON ATTACHMENTS, TO THE MATERIAL AND DIMENSIONS AS SPECIFIED AND DETAILED ON THESE DRAWINGS.
3. SUPPLY, FABRICATION, GALVANIZING AND INSTALLATION OF FOUR STEEL SLEEVE INSERTS AS SPECIFIED AND DETAILED ON DWG. NO. 6862-P1-102.
4. SUPPLY, FABRICATION, GALVANIZING AND INSTALLATION OF FOUR RING FLANGE/WEDGE ASSEMBLIES AS SPECIFIED AND DETAILED ON DWG. NO. 6862-P1-102.
5. SUPPLY AND INSTALLATION OF STAINLESS STEEL CABLE, STAINLESS STEEL HARDWARE FOR CABLE ATTACHMENTS, MONOFILAMENT LINE AND ADJUSTABLE CONNECTORS AS SPECIFIED AND DETAILED ON DWG. NO. 6862-P1-103.
6. RESTORE ACCESS ROUTE USED FOR PREVIOUS WORK AS SHOWN ON THE ABOVE SITE PLAN. WORK REQUIRED INCLUDES FINE GRADING, TOPSOIL AND SOD OF APPROXIMATELY 300m²
7. RESTORE ALL SURFACES USED AS WORKING AREAS OR ACCESS TO THE WORK, TO ORIGINAL CONDITION AND ACCEPTIBLE TO THE ENGINEER. (INCIDENTAL TO THE CONTRACT)
8. DISASSEMBLE OVERHEAD WIRING, REMOVE POLES AT WATER LOCATIONS AND REPLACE STEEL COVERS AND SAND BAGS. WIRING AND CABLE SHALL BE ROLLED INTO NEAT BALES AND STORED WITH POLES AT A LOCATION TO BE DETERMINED BY THE CITY. POLES AT BEACH LOCATIONS MAY BE LEFT IN PLACE.

Stantec Consulting Ltd.
400 – 1505 Laperriere
Ottawa ON Canada
K1Z 7T1
Tel. (613) 722-4420
Fax. (613) 722-2790
www.stantec.com

General Notes

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS NOTED OTHERWISE.

Construction Notes

0

Revision	By	Appd.	Date

Issued	By	Appd.	Date
File Name: 6862-101.DWG	T.J.N.	G.A.M.	G.A.M.	99.04.22
	Dwn.	Chkd.	Dsgn.	Date

Permit/Seal

REGISTERED PROFESSIONAL ENGINEER
G.ÎA.ÎMcROBIE
PROVINCE OF ONTARIO

Client/Project

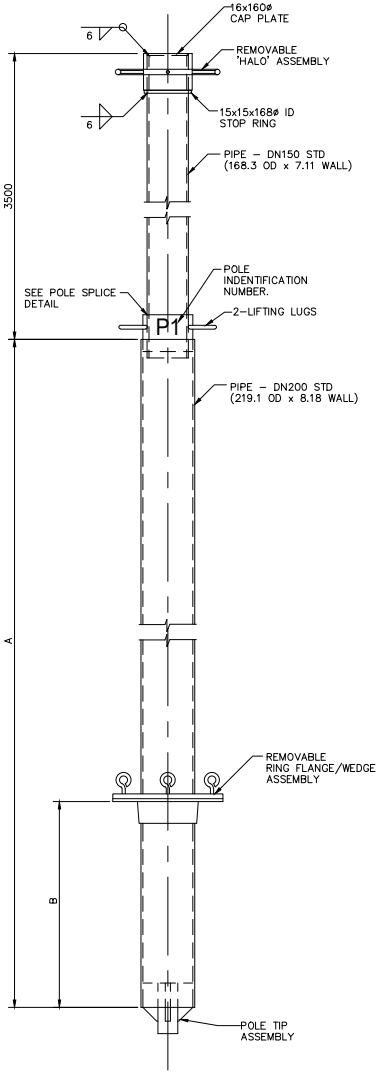
BRITANNIA BEACH
GULL MANAGEMENT FACILITY
Ottawa, Ontario

Title

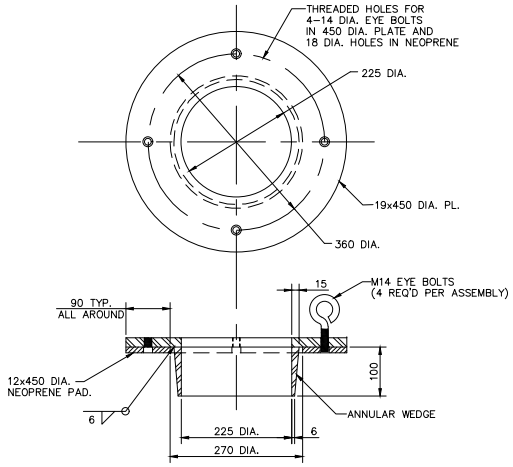
PHASE 1
OVERHEAD WIRING SYSTEM
MESH LAYOUT

Project No.	Scale
S6862	AS SHOWN

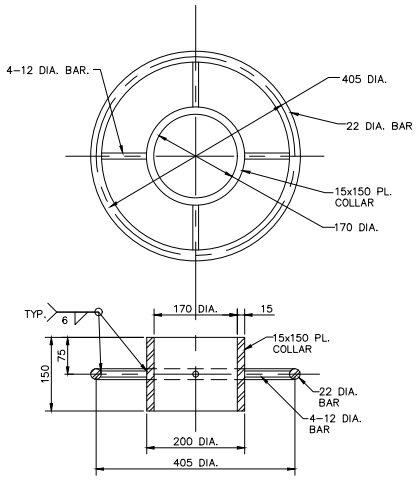
Drawing No.	Sheet	Revision
6862-P1-101	1 of 3	0



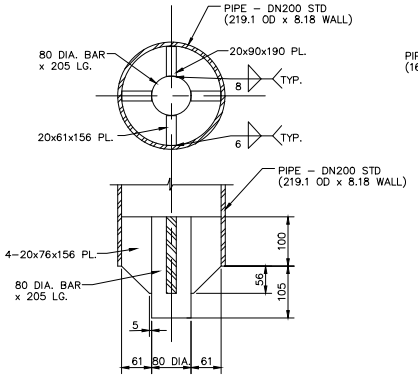
POLE DETAILS
(4 REQUIRED AS NOTED)
1:10



RING FLANGE/WEDGE ASSEMBLY
(4 REQUIRED)
1:5

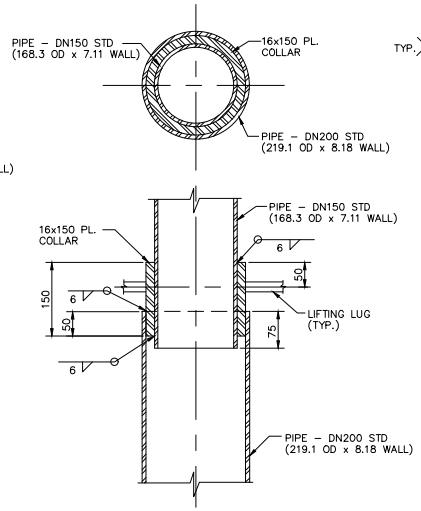


'HALO' ASSEMBLY
(4 REQUIRED)
1:5

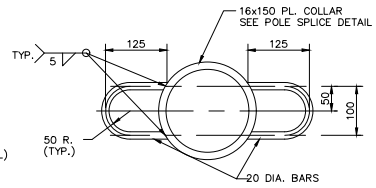


POLE TIP ASSEMBLY
(4 REQUIRED)
1:5

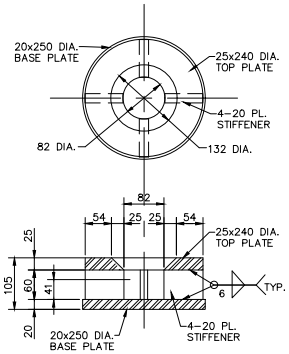
TABLE OF POLE DIMENSIONS		
POLE	'A'	'B'
P1	7680	1570
P2	6840	870
P3	8020	870
P4	5770	870



POLE SPLICE DETAIL
1:5



LIFTING LUG DETAILS
1:5



SLEEVE INSERT DETAILS
(4 REQUIRED)
1:5

Stantec Consulting Ltd.
400 – 1505 Laperriere
Ottawa ON Canada
K1Z 7T1
Tel. (613) 722-4420
Fax. (613) 722-2790
www.stantec.com

Stantec

Notes

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. STEEL SHALL BE IN ACCORDANCE WITH CSA STANDARD G40.21M, LATEST EDITION, GRADE 300W.
3. PIPE SHALL BE IN ACCORDANCE WITH A.S.T.M. STANDARD A53, WITH A MINIMUM YIELD STRENGTH OF 205 MPa.
4. WELDING SHALL BE DONE IN ACCORDANCE WITH CSA STANDARD W59, LATEST EDITION. ELECTRODE CLASSIFICATION SHALL BE E480XX.
5. ALL STEEL, PIPE AND HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH CSA STANDARD G164–M, LATEST EDITION. MINIMUM 600 g/m².
6. NEOPRENE PADS SHALL BE 50 DUROMETRE HARDNESS AND SHALL BE FASTENED TO RING FLANGE/WEDGE ASSEMBLIES AFTER ASSEMBLIES HAVE BEEN GALVANIZED USING AN ADHESIVE COMPATIBLE WITH GALVANIZED SURFACES AND AS APPROVED BY THE NEOPRENE MANUFACTURER.
7. THE CONTRACTOR SHALL SUBMIT STEEL FABRICATION SHOP DRAWINGS FOR REVIEW BY THE ENGINEER PRIOR TO FABRICATION.
8. MILL CERTIFICATES FOR ALL STEEL USED SHALL BE SUBMITTED FOR REVIEW BY THE ENGINEER PRIOR TO FABRICATION.
9. POLE IDENTIFICATION NUMBERS SHALL BE PAINTED ON TWO SIDES OF THE POLE AT LOCATION SHOWN, AFTER GALVANIZING. NUMBERS SHALL BE 80mm IN HEIGHT AND SHALL BE BLACK IN COLOUR.

Revision	By	Appd.	Date
0			

Issued	By	Appd.	Date
File Name: 6862–102.DWG	T.J.N. Dwn.	G.A.M. Chkd.	G.A.M. Dsgn.	99.04.22 Date

Permit/Seal

REGISTERED PROFESSIONAL ENGINEER
C.I.A.McROBIE
PROVINCE OF ONTARIO

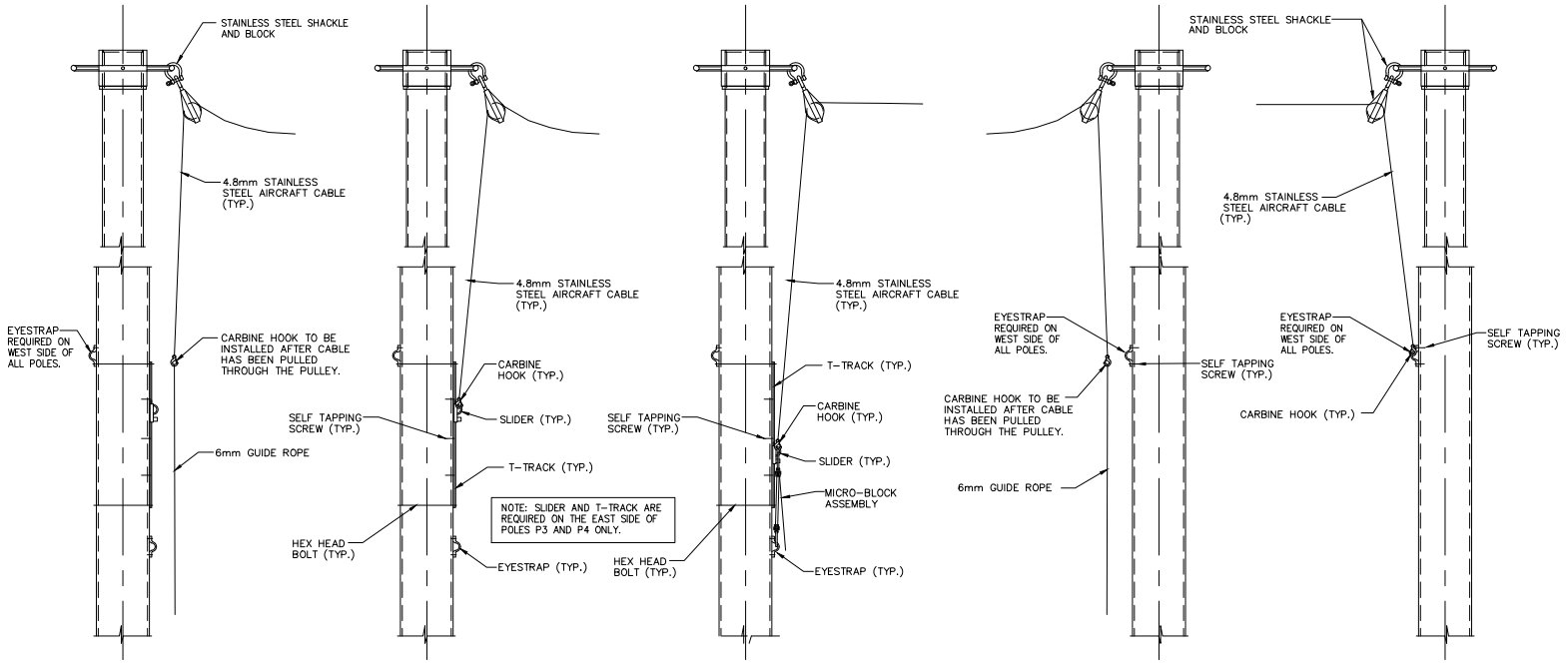
Client/Project

BRITANNIA BEACH
GULL MANAGEMENT FACILITY
Ottawa, Ontario

Title

PHASE 1
OVERHEAD WIRING SYSTEM
POLE DETAILS

Project No.	Scale	
S6862	AS SHOWN	
Drawing No.	Sheet	Revision
6862-P1-102	2 of 3	0



POLES P3 AND P4

CABLE RIGGING
1:10

POLES P1 AND P2

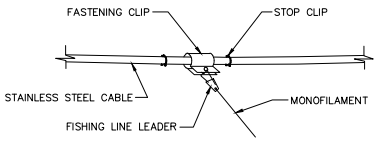
POLE AND CABLE INSTALLATION PROCEDURE

1. REMOVE COVERS FOR FOOTINGS (REFER TO DWG 6862-P1-002) AND CLEAN OUT STEEL SLEEVES. INSTALL STEEL SLEEVE INSERTS AS DETAILED ON DWG 6862-P1-102.
2. INSTALL 6mm GUIDE ROPE AND CABLE TENSIONING HARDWARE FOR EACH POLE.
3. ERECT POLES, INCLUDING ALL ASSEMBLIES AS SHOWN ON DWG. 6862-P1-102.
4. LAYOUT CABLE/MONOFILAMENT NETTING
5. FEED CABLE THROUGH PULLEYS AT POLES P1 AND P2. SECURE TO EYESTRAP USING A CARBINE HOOK.
6. FEED CABLE TROUGH PULLEYS AT POLES P3 AND P4. SECURE TO SLIDERS USING A CARBINE HOOK.

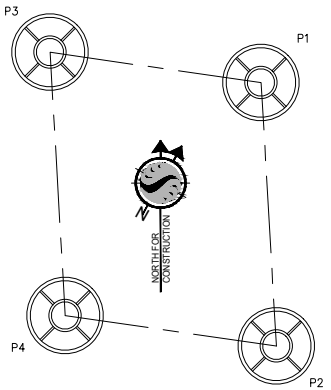
   NOTE: STEPS 5 AND 6 ARE TO BE PERFORMED SIMULTANEOUSLY.
7. INSTALL MICRO-BLOCK ASSEMBLIES.
8. TENSION CABLE USING MICRO-BLOCK ASSEMBLY AND SECURE SLIDER IN PLACE ONCE THE REQUIRED TENSION HAS BEEN REACHED.
9. REMOVE MICRO-BLOCK ASSEMBLIES.

POLE AND CABLE REMOVAL PROCEDURE

1. INSTALL MIRCO-BLOCK ASSEMBLIES. (POLES P3 AND P4)
2. RELEASE SLIDER AND DETENSION CABLE USING THE MICRO-BLOCK ASSEMBLIES.
3. REMOVE CARBINE HOOK AND ATTACH 6mm ROPE TO CABLE. ALLOW CABLE TO PULL ROPE BACK THROUGH PULLEY SYSTEM.
4. REPEAT STEP 3 AT POLES P1 AND P2.
5. REMOVE POLES FROM FOUNDATIONS. USE EYE BOLTS ON THE RING FLANGE/WEDGE ASSEMBLIES TO LOOSEN POLES FROM FOUNDATION SLEEVES.
6. COVER FOUNDATIONS USING COVERS AS SHOWN ON DWG. 6862-P1-002.
7. STORE POLES, CABLES AND MONOFILAMENTS FOR REUSE.



TYPICAL MONOFILAMENT DETAIL
N.T.S



POLE AND HALO ORIENTATION
N.T.S

Stantec Consulting Ltd.
400 – 1505 Laperriere
Ottawa ON Canada
K1Z 7T1
Tel. (613) 722-4420
Fax. (613) 722-2790
www.stantec.com

Stantec

Notes

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL HARDWARE, INCLUDING PULLEYS, CARBINES EYESTRAPS, SLIDERS AND T-TRACKS ARE TO BE STAINLESS STEEL.
3. CABLES SHALL BE 4.8mm (3/16") STAINLESS STEEL MULTI-STRAND AIRCRAFT CABLE.
4. MONOFILAMENT LINE SHALL BE 178 N (40 lb.) CLEAR "BERKLEY XT" LINE OR APPROVED EQUAL. REFER TO TABLE 1 ON DWG 6862-P1-101 FOR REQUIRED LENGTHS.
5. THE SUCCESSFUL CONTRACTOR SHALL SUBMIT ALL HARDWARE PRODUCT DATA SHEETS FOR REVIEW BY THE ENGINEER PRIOR TO PROCUREMENT. EQUAL OR BETTER ALTERNATIVES TO THE SPECIFIED OVERHEAD WIRING SYSTEM COMPONENTS MAY BE SUBMITTED FOR REVIEW BY THE ENGINEER. ALL STAINLESS STEEL COMPONENTS SHALL BE REQUIRED TO RESIST A WORKING LOAD OF 2 kN. (ULTIMATE LOAD OF 6 kN.)
6. NO WORK SHALL BE PERMITTED ON THE WEEKENDS.

Revision	By	Appd.	Date
0			

Issued	By	Appd.	Date
File Name: 6862-103.DWG	T.J.N. Dwn.	G.A.M. Chkd.	G.A.M. Dsgn.	99.04.22 Date

Permit/Seal

REGISTERED PROFESSIONAL ENGINEER G.(A.)McROBIE PROVINCE OF ONTARIO

Client/Project

BRITANNIA BEACH
GULL MANAGEMENT FACILITY
Ottawa, Ontario

Title

PHASE 1
OVERHEAD WIRING SYSTEM
WIRING INSTALLATION AND DETAILS

Project No.	Scale	
S6862	AS SHOWN	
Drawing No.	Sheet	Revision
6862-P1-103	3 of 3	0

Stantec

NO.	REVISION	BY	DATE
1	ISSUED FOR TENDER	G.A.M.	15.01.02

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

BRITANNIA BEACH
GULL MANAGEMENT FACILITY

PHASE 2
GENERAL ARRANGEMENT

R.G. HEWITT, P.ENG.
Director Infrastructure Services

W. BENNETT, P.ENG.
Manager Construction Services

Dwn: C.L.D. Chkd: G.A.M. Des: C.L.D. Chkd: G.A.M.

Ottawa

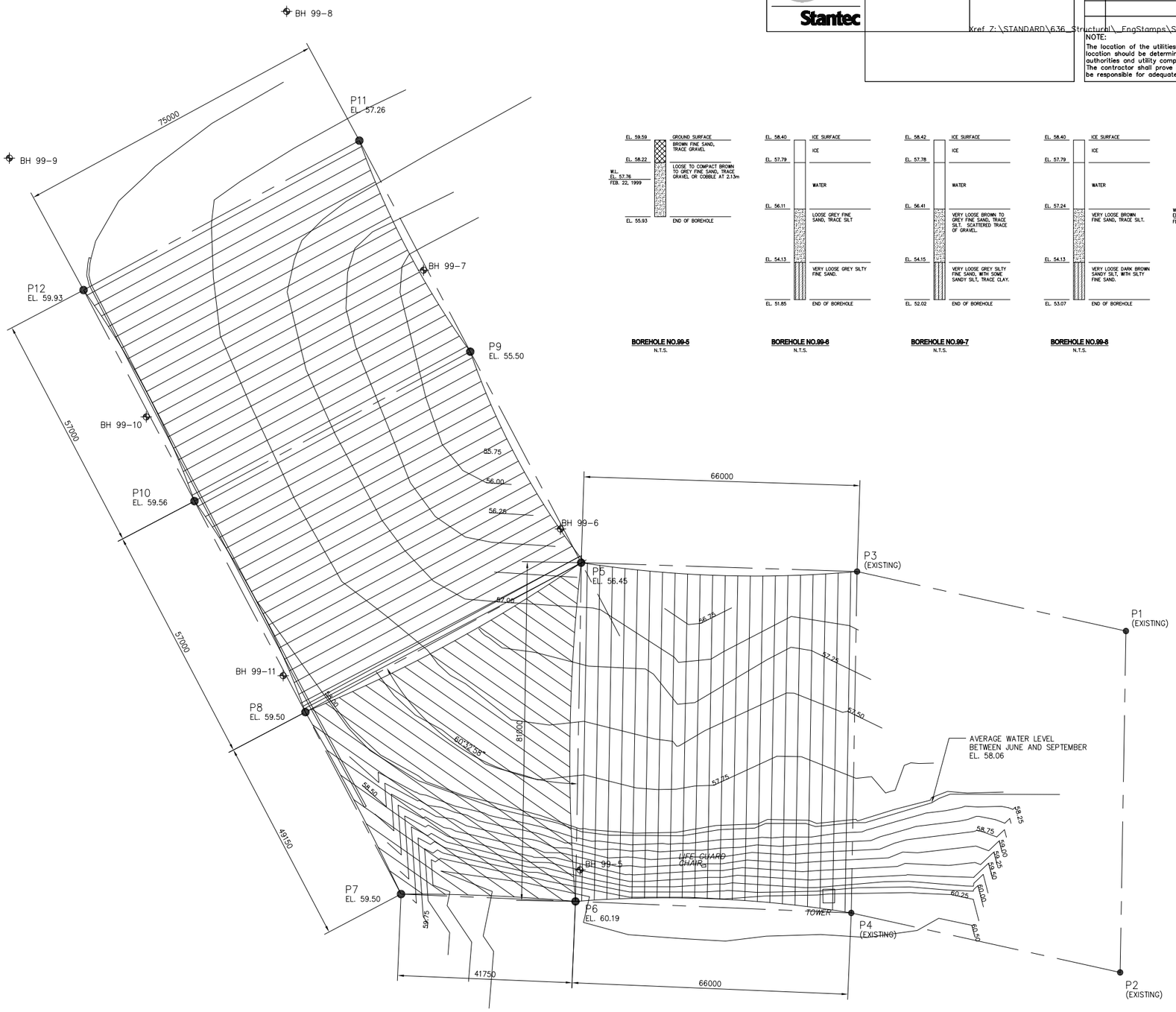
CONTRACT NO.
00902-75573-T01

DWG. NO.
S1

SHEET 1 OF 5

Date: JANUARY 2002

Scale: AS SHOWN



SITE PLAN
1:500

BOREHOLE NO.99-5
N.T.S.

BOREHOLE NO.99-6
N.T.S.

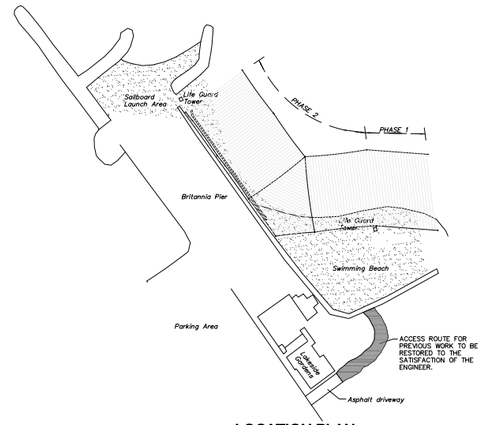
BOREHOLE NO.99-7
N.T.S.

BOREHOLE NO.99-8
N.T.S.

BOREHOLE NO.99-9
N.T.S.

BOREHOLE NO.99-10
N.T.S.

BOREHOLE NO.99-11
N.T.S.



LOCATION PLAN
N.T.S.

General Notes

1. THE SITE CONDITIONS AND ICE THICKNESSES GIVEN IN THE BOREHOLE LOGS EXISTED ON FEBRUARY 22 AND 23, 1999. THE CONTRACTOR SHOULD NOT EXPECT THAT CONDITIONS WILL BE SIMILAR AT THE TIME THE WORK IS DONE.
2. THE CONTRACTOR SHALL VERIFY THE CONDITIONS AT THE TIME OF CONSTRUCTION.
3. FOUNDATIONS FOR POLES P5, P9 & P11 MUST BE INSTALLED FROM THE SURFACE OF THE ICE, AT A TIME WHEN SUFFICIENT THICKNESS OF ICE HAS FORMED TO SAFELY SUPPORT THE REQUIRED CONSTRUCTION LOADS.

Construction Notes

1. THE FOLLOWING SUGGESTIONS ARE MADE FOR INFORMATION PURPOSES ONLY.
2. STEEL LINERS SHALL BE DRIVEN A MINIMUM 1 METRE BELOW THE SPECIFIED BOTTOM OF CAISSONS AND SHOULD EXTEND ABOVE THE ICE/GROUND LEVEL AS APPROPRIATE. MATERIAL SHALL BE EXCAVATED TO THE SPECIFIED BOTTOM OF CAISSONS.
3. IF EXCAVATION FILLS WITH WATER ON DEWATERING, EXCAVATE A FURTHER 0.5m AND PLACE A TREMIE CONCRETE PLUG.
4. PLUMBNESS OF FOUNDATIONS, THE SLEEVES IN PARTICULAR, IS OF PRIME IMPORTANCE AND NO TOLERANCE IS SPECIFIED OR PERMISSIBLE.
5. CONTRACTOR SHALL SUBMIT PROPOSED CONSTRUCTION PROCEDURES TO THE ENGINEER FOR REVIEW.

NO.	REVISION	BY	DATE
1	ISSUED FOR TENDER	G.A.M.	15.01.02

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

BRITANNIA BEACH
GULL MANAGEMENT FACILITY

PHASE 2
FOUNDATION DETAILS

R.G. HEWITT, P.ENG. — Director Infrastructure Services
W. BENNETT, P.ENG. — Manager Construction Services

Dwn: H.S.D. | Chkd: G.A.M. | Des: C.L.D. | Chkd: G.A.M.

Ottawa

CONTRACT NO.
00902-75573-T01

DWG. NO.
S2

SHEET 2 OF 5

Date: JANUARY 2002

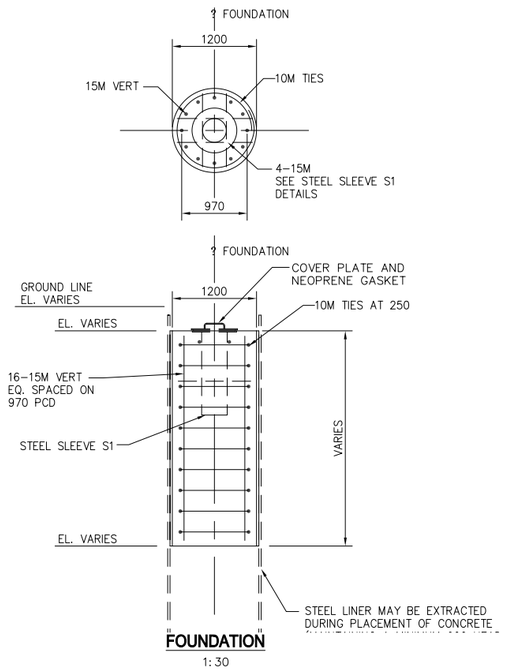
Scale: AS SHOWN

TABLE OF FOUNDATION DIMENSIONS & ELEVATIONS

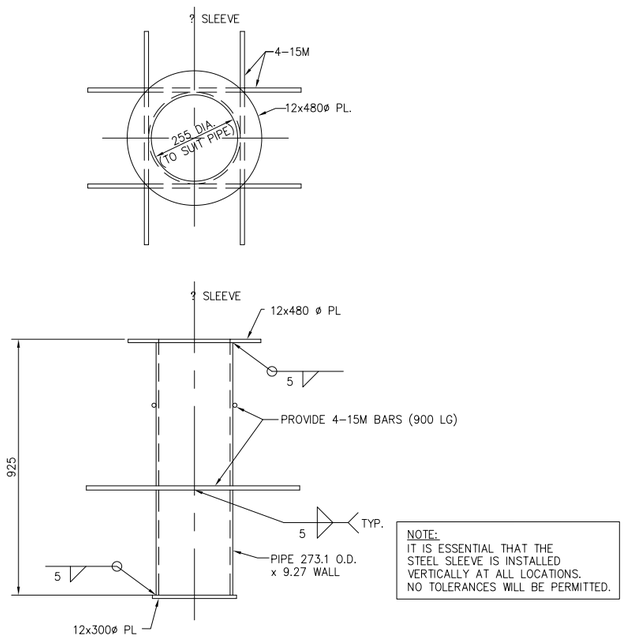
POLE	LOCATION	GROUND ELEVATION (m)	TOP OF FOUNDATION ELEVATION (m)	FOUNDATION DEPTH (m)	U/S FOUNDATION ELEVATION (m)
P5	OFFSHORE	56.45	56.20	2.70	53.50
P6	BEACH	60.19	59.90	2.70	57.20
P7	BEACH	59.50±	59.40	3.20	56.20
P8	BEHIND WALL	59.50	59.40	2.70	56.70
P9	OFFSHORE	55.50	55.25	2.70	53.55
P10	BEHIND WALL	59.56	59.45	2.70	56.75
P11	OFFSHORE	57.26	57.00	2.70	54.30
P12	BEHIND WALL	59.93	59.95	2.70	57.25

GENERAL NOTES:

1. CLASS OF CONCRETE SHALL BE 30 MPa, AIR ENTRAINED 5 TO 8%.
2. REINFORCING STEEL SHALL BE GRADE 400.
3. CLEAR COVER TO REINFORCING STEEL SHALL BE 100mm ± 20mm
4. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
5. SLEEVES SHALL BE STEEL PIPE SECTIONS TO ASTM A53, GRADE 240 (Fy = 240 MPa) ALL REMAINING STEEL SHALL BE IN ACCORDANCE WITH CAN/CSA G40.21 M92, GRADE 260W OR APPROVED EQUAL.
6. ALL STEEL SLEEVES ANDCOVER PLATES SHALL BE GALVANISED IN ACCORDANCE WITH CSA G164-M, MINIMUM 600g/m^2.
7. WELDING SHALL BE IN ACCORDANCE WITH CSA STANDARD W59, LATEST EDITION.
8. FOR LOCATION OF FOUNDATIONS, REFER TO DRAWING S1. THE ENGINEER WILL ASSIST WITH IDENTIFYING LOCATIONS IN THE FIELD IF REQUIRED.
9. FOUNDATIONS FOR POLES P5, P9 & P11 MUST BE INSTALLED FROM THE SURFACE OF THE ICE, AT A TIME WHEN SUFFICIENT ICE THICKNESS HAS FORMED TO SAFELY SUPPORT THE REQUIRED CONSTRUCTION LOADS.
10. NEOPRENE GASKET SHALL BE 50 DUROMETRE HARDNESS AND SHALL BE FASTENED TO THE COVER PLATE AFTER GALVANISING USING AN ADHESIVE COMPATIBLE WITH GALVANISED SURFACES AND APPROVED BY THE NEOPRENE MANUFACTURER.
11. COVER PLATE TO BE PLACED ON CAISSON FOLLOWING CONSTRUCTION.

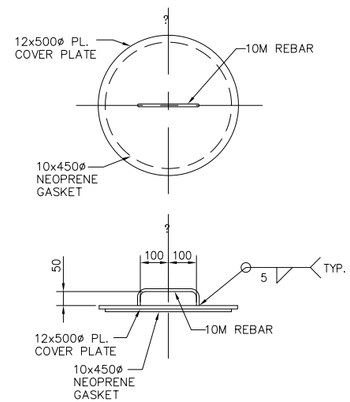


FOUNDATION
1:30



NOTE:
IT IS ESSENTIAL THAT THE STEEL SLEEVE IS INSTALLED VERTICALLY AT ALL LOCATIONS. NO TOLERANCES WILL BE PERMITTED.

STEEL SLEEVE - S1
1:10
(8 REQUIRED)



COVER PLATE AND NEOPRENE GASKET
1:10
(8 REQUIRED)

Stantec

NO.	REVISION	BY	DATE
1	ISSUED FOR TENDER	G.A.M.	15.01.02

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

BRITANNIA BEACH
GULL MANAGEMENT FACILITY

PHASE 2 – POLE DETAILS

R.G. HEWITT, P.ENG. Director Infrastructure Services		W. BENNETT, P.ENG. Manager Construction Services	
Dwn: C.L.D.	Chkd: G.A.M.	Des: C.L.D.	Chkd: G.A.M.

Ottawa

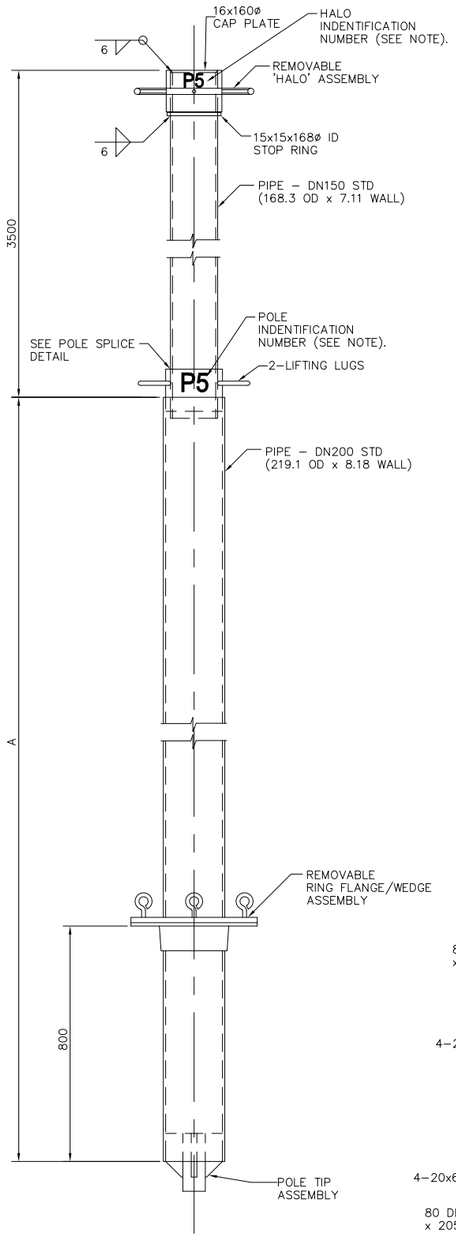
CONTRACT NO.
00902–75573–T01

DWG. NO.
S3

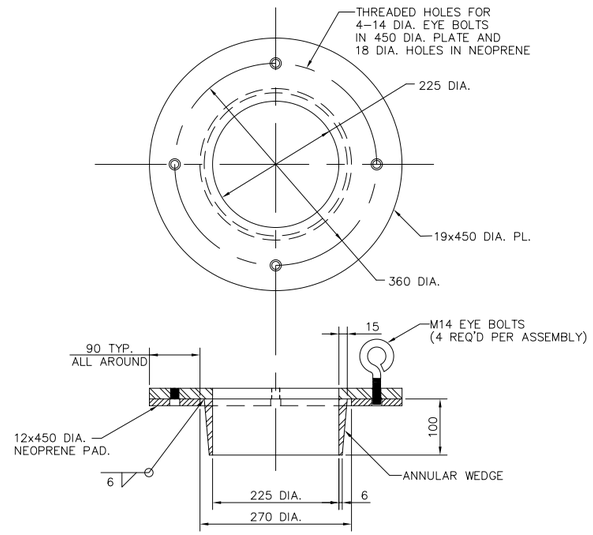
SHEET 3 OF 5

Date: JANUARY 2002

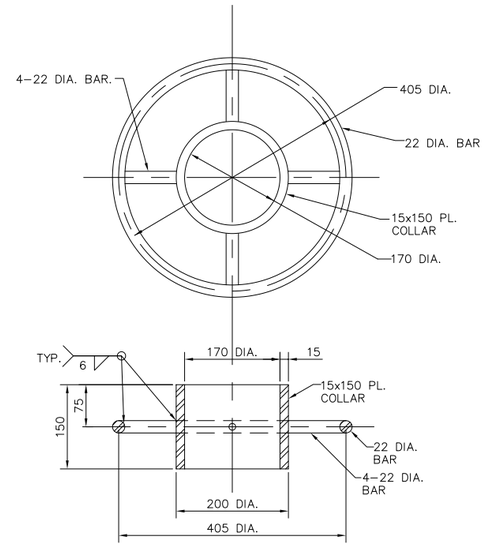
Scale: AS SHOWN



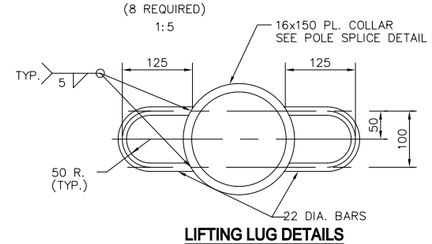
POLE DETAILS
(8 REQUIRED AS NOTED)
1:10



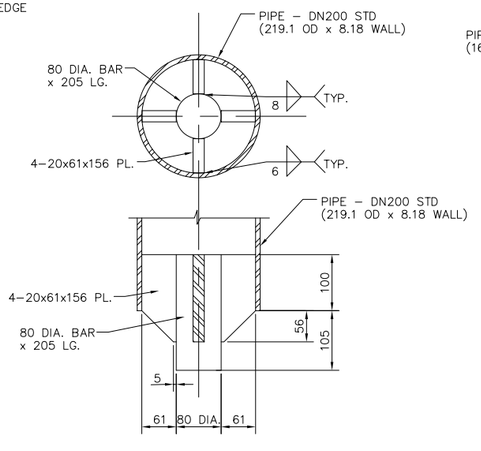
RING FLANGE/WEDGE ASSEMBLY
(8 REQUIRED)
1:5



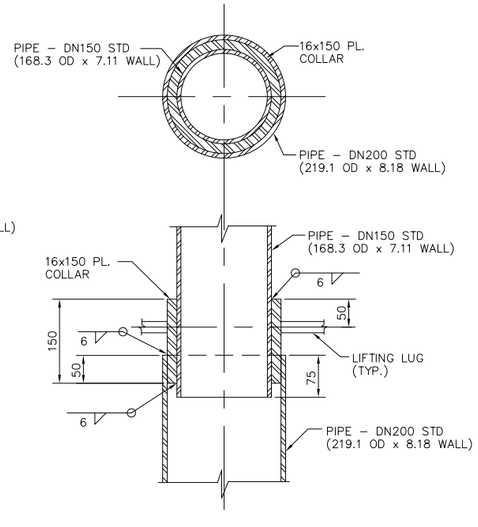
'HALO' ASSEMBLY
(8 REQUIRED)
1:5



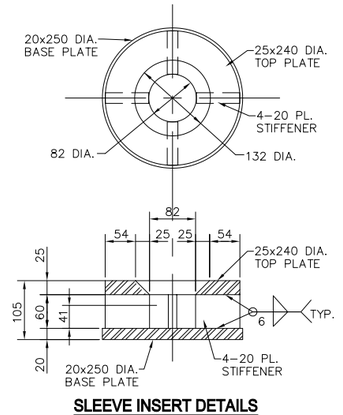
LIFTING LUG DETAILS
1:5



POLE TIP ASSEMBLY
(8 REQUIRED) 1:5



POLE SPLICE DETAIL
1:5



SLEEVE INSERT DETAILS
(8 REQUIRED) 1:5

NOTES:

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. STEEL SHALL BE IN ACCORDANCE WITH CSA STANDARD G40.21M, LATEST EDITION, GRADE 300W.
3. PIPE SHALL BE IN ACCORDANCE WITH A.S.T.M. STANDARD A53, WITH A MINIMUM YIELD STRENGTH OF 205 MPa.
4. WELDING SHALL BE DONE IN ACCORDANCE WITH CSA STANDARD W59, LATEST EDITION. ELECTRODE CLASSIFICATION SHALL BE E480XX.
5. ALL STEEL, PIPE AND HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH CSA STANDARD G164–M, LATEST EDITION. MINIMUM 600 g/m^2
6. NEOPRENE PADS SHALL BE 50 DUROMETRE HARDNESS AND SHALL BE FASTENED TO RING FLANGE/WEDGE ASSEMBLIES AFTER ASSEMBLIES HAVE BEEN GALVANIZED USING AN ADHESIVE COMPATIBLE WITH GALVANIZED SURFACES AND AS APPROVED BY THE NEOPRENE MANUFACTURER.
7. THE CONTRACTOR SHALL SUBMIT STEEL FABRICATION SHOP DRAWINGS FOR REVIEW BY THE ENGINEER PRIOR TO FABRICATION.
8. MILL CERTIFICATES FOR ALL STEEL USED SHALL BE SUBMITTED FOR REVIEW BY THE ENGINEER PRIOR TO FABRICATION.
9. POLE IDENTIFICATION NUMBERS SHALL BE PAINTED ON TWO SIDES OF THE POLE AT LOCATION SHOWN, AFTER GALVANIZING. NUMBERS SHALL BE 80mm IN HEIGHT AND SHALL BE BLACK IN COLOUR.
10. HALO IDENTIFICATION NUMBERS SHALL BE PAINTED ON TWO SIDES OF THE HALO AT LOCATION SHOWN, AFTER GALVANIZING. NUMBERS SHALL BE 40mm IN HEIGHT AND SHALL BE BLACK IN COLOUR.
11. NOTE THAT HALO ASSEMBLIES USED FOR POLES P3 AND P4 (PHASE 1) ARE NOW TO BE USED FOR POLES P10 AND P11. NEW HALO ASSEMBLIES ARE TO BE USED AT POLES P3 AND P4. HALO IDENTIFICATION NUMBERS SHOULD MATCH POLE IDENTIFICATION NUMBERS ACCORDINGLY.

TABLE OF POLE CHARACTERISTICS

POLE	'A'	WEIGHT (kg)
P5	8100	530
P6	5900	430
P7	6200	450
P8	6200	450
P9	9050	570
P10	6150	440
P11	7300	490
P12	5750	430

MONOFILAMENT NO.	LENGTH (m)
B1	80.839
B2	80.525
B3	80.268
B4	80.021
B5	79.830
B6	79.660
B7	79.524
B8	79.421
B9	79.351
B10	79.302
B11	79.310
B12	79.327
B13	79.389
B14	79.495
B15	79.624
B16	79.785
B17	79.979
B18	80.206
B19	80.467
B20	80.761
B21	81.087
B22	81.447

MONOFILAMENT NO.	LENGTH (m)
C1	4.733
C2	7.992
C3	11.294
C4	14.635
C5	18.011
C6	21.424
C7	24.872
C8	28.357
C9	31.877
C10	35.431
C11	39.022
C12	42.648
C13	46.309
C14	50.007
C15	53.739
C16	57.506
C17	61.309
C18	65.147
C19	69.308
C20	73.116
C21	76.941

MONOFILAMENT NO.	LENGTH (m)
D1	74.901
D2	74.613
D3	74.359
D4	74.137
D5	73.949
D6	73.794
D7	73.673
D8	73.584
D9	73.529
D10	73.507
D11	73.519
D12	73.563
D13	73.641
D14	73.752
D15	73.897
D16	74.074
D17	74.285
D18	74.529
D19	74.806

MONOFILAMENT NO.	LENGTH (m)
E1	74.901
E2	74.613
E3	74.359
E4	74.137
E5	73.949
E6	73.794
E7	73.673
E8	73.584
E9	73.529
E10	73.507
E11	73.519
E12	73.563
E13	73.641
E14	73.752
E15	73.897
E16	74.074
E17	74.285
E18	74.529
E19	74.806

MONOFILAMENT NO.	LENGTH (m)
F1	73.517
F2	62.886
F3	52.332
F4	41.851
F5	31.446
F6	21.116
F7	10.861

Stantec

NO.	REVISION	BY	DATE
1	ISSUED FOR TENDER	G.A.M.	15.01.02

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

BRITANNIA BEACH
GULL MANAGEMENT FACILITY

PHASE 2 – CABLE AND MONOFILAMENT ARRANGEMENT

R.G. HEWITT, P.ENG. Director Infrastructure Services		W. BENNETT, P.ENG. Manager Construction Services	
Dwn: C.L.D.	Chkd: G.A.M.	Des: C.L.D.	Chkd: G.A.M.

Ottawa

CONTRACT NO.
00902–75573–T01

DWG. NO.
S4

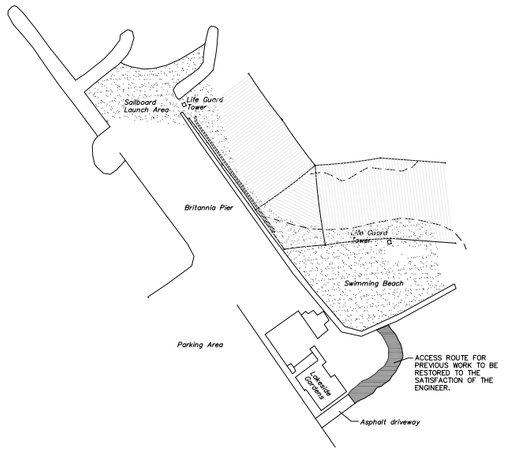
SHEET 4 OF 5

Date: JANUARY 2002

Scale: AS SHOWN

NOTES:

1. ALL DIMENSIONS ARE SHOWN IN METRES UNLESS NOTED OTHERWISE.
2. CABLES SHALL BE 4.8mm (3/16") STAINLESS STEEL MULTI–STRAND AIRCRAFT CABLE.
3. MONOFILIMENT LINE SHALL BE 178N (40 lb) CLEAR "BERKLEY XT" OR APPROVED EQUAL.
4. THE SUCCESSFUL CONTRACTOR SHALL SUBMIT ALL HARDWARE DATA SHEETS TO THE ENGINEER PRIOR TO PROCUREMENT. EQUAL OR BETTER ALTERNATIVES TO THE SPECIFIED COMPONENTS MAY BE SUBMITTED FOR REVIEW BY THE ENGINEER.
5. REFER TO DRAWING S5 FOR CONNECTION AND INSTALLATION DETAILS.



LOCATION PLAN
N.T.S.

MESH LAYOUT
1: 500

NO.	REVISION	BY	DATE
1	ISSUED FOR TENDER	G.A.M.	15.01.02

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

BRITANNIA BEACH
GULL MANAGEMENT FACILITY

PHASE 2
WIRING INSTALLATION DETAILS

R.G. HEWTT, P.ENG. Director Infrastructure Services		W. BENNETT, P.ENG. Manager Construction Services	
Dwn: C.L.D.	Chkd: G.A.M.	Des: C.L.D.	Chkd: G.A.M.

Ottawa
CONTRACT NO. 00902-75573-T01
DWG. NO. S5
SHEET 5 OF 5
Date: JANUARY 2002
Scale: AS SHOWN

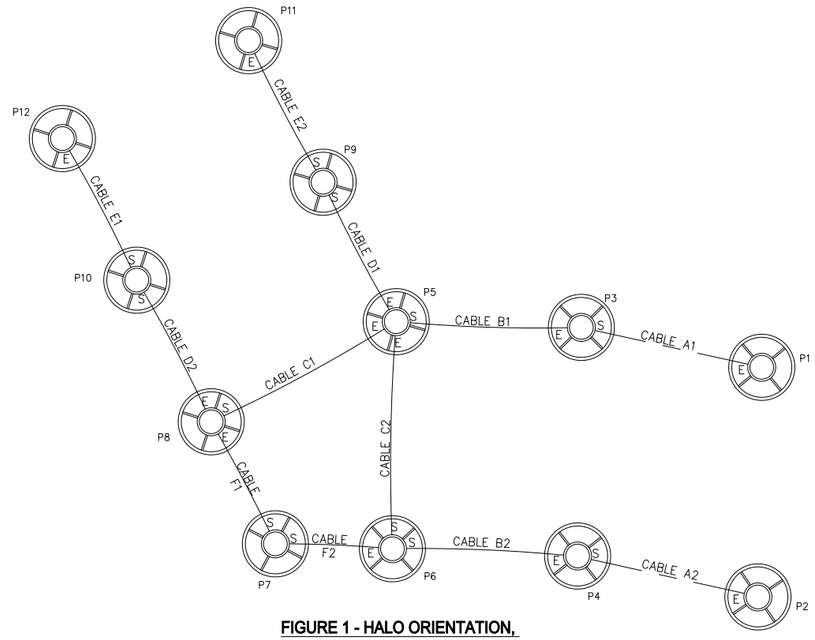
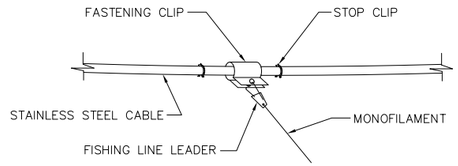


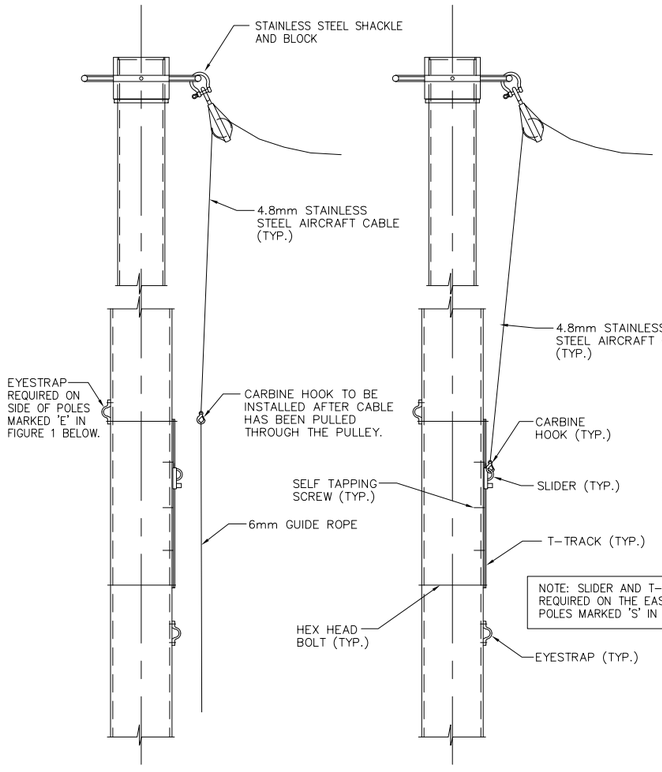
FIGURE 1 - HALO ORIENTATION, EYESTRAP & SLIDER LOCATIONS
N.T.S



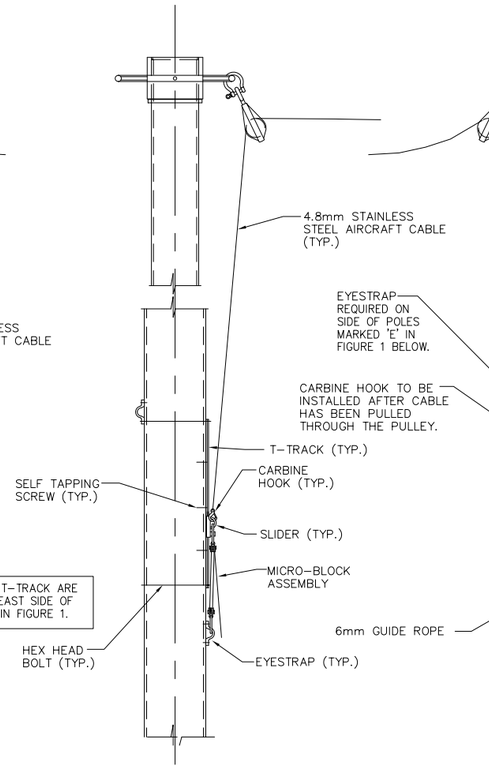
TYPICAL MONOFILAMENT DETAIL
N.T.S

GENERAL NOTES

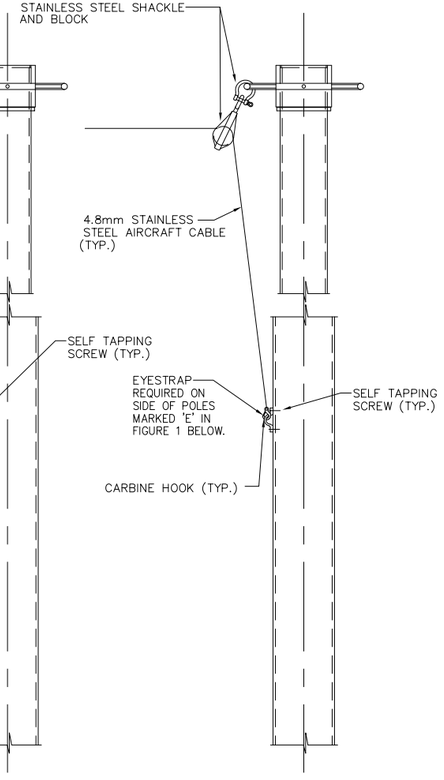
1. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL HARDWARE, INCLUDING PULLEYS, CARBINES, EYESTRAPS, SLIDERS AND T-TRACKS ARE TO BE STAINLESS STEEL.
3. CABLES SHALL BE 4.8mm (3/16") STAINLESS STEEL MULTI-STRAND AIRCRAFT CABLE.
4. MONOFILAMENT LINE SHALL BE 178 N (40 lb.) CLEAR "BERKELEY XT" LINE OR APPROVED EQUAL. REFER TO TABLES ON DRAWING S4 FOR REQUIRED LENGTHS.
5. THE SUCCESSFUL CONTRACTOR SHALL SUBMIT ALL HARDWARE PRODUCT DATA SHEETS FOR REVIEW BY THE ENGINEER PRIOR TO PROCUREMENT. EQUAL OR BETTER ALTERNATIVES TO THE SPECIFIED OVERHEAD WIRING SYSTEM COMPONENTS MAY BE SUBMITTED FOR REVIEW BY THE ENGINEER. ALL STAINLESS STEEL COMPONENTS SHALL BE REQUIRED TO RESIST A WORKING LOAD OF 2.4kN (ULTIMATE LOAD OF 6.0kN).
6. NO WORK SHALL BE PERMITTED ON THE WEEKENDS.
7. NOTE THAT ALL HARDWARE RELATING TO P1 TO P4 HAS ALREADY BEEN COMPLETED UNDER PHASE 1. THESE POLES ARE SHOWN HERE FOR COMPLETENESS.
8. FOR FIRST INSTALLATION OF PHASE 2 ONLY, HALO ASSEMBLIES FROM POLES P3 & P4 ARE TO BE TRANSFERRED TO POLES P11 & P12 REPECTIVELY. (REFER TO DRAWING 3 FOR MORE INFORMATION).



POLES WITH SLIDERS AND T-TRACKS (POLES P3 TO P10 - SEE ABOVE)



CABLE RIGGING
1:10



POLES WITH EYESTRAPS (P1 TO P8, P11 - SEE ABOVE)

POLE AND CABLE INSTALLATION PROCEDURE

1. REMOVE COVERS FOR FOOTINGS (REFER TO DWG S2) AND CLEAN OUT STEEL SLEEVES. INSTALL STEEL SLEEVE INSERTS AS DETAILED ON DWG S3.
2. INSTALL 6mm GUIDE ROPE AND CABLE TENSIONING HARDWARE FOR EACH POLE.
3. ERECT POLES, INCLUDING ALL ASSEMBLIES AS SHOWN ON DWG. S3.
4. LAYOUT CABLE/MONOFILAMENT NETTING
5. FEED CABLE THROUGH PULLEYS AT POLES MARKED 'E'. SECURE TO EYESTRAP USING A CARBINE HOOK.
6. FEED CABLE TROUGH PULLEYS AT POLES MARKED 'S'. SECURE TO SLIDERS USING A CARBINE HOOK.

   NOTE: STEPS 5 AND 6 ARE TO BE PERFORMED SIMULTANEOUSLY AT ALL POLES.
7. INSTALL MICRO-BLOCK ASSEMBLIES.
8. TENSION CABLE USING MICRO-BLOCK ASSEMBLY AND SECURE SLIDER IN PLACE ONCE THE REQUIRED TENSION HAS BEEN REACHED.
9. REMOVE MICRO-BLOCK ASSEMBLIES.

POLE AND CABLE REMOVAL PROCEDURE

1. INSTALL MIRCO-BLOCK ASSEMBLIES. (POLES MARKED 'S')
2. RELEASE SLIDER AND DETENSION CABLE USING THE MICRO-BLOCK ASSEMBLIES.
3. REMOVE CARBINE HOOK AND ATTACH 6mm ROPE TO CABLE. ALLOW CABLE TO PULL ROPE BACK THROUGH PULLEY SYSTEM.
4. REPEAT STEP 3 AT POLES MARKED 'E'.
5. REMOVE POLES FROM FOUNDATIONS. USE EYE BOLTS ON THE RING FLANGE/WEDGE ASSEMBLIES TO LOOSEN POLES FROM FOUNDATION SLEEVES.
6. REMOVE STEEL SLEEVE INSERTS FROM STEEL SLEEVES.
7. COVER FOUNDATIONS USING COVERS AS SHOWN ON DWG S2.
8. STORE POLES, SLEEVE INSERTS, CABLES AND MONOFILAMENTS FOR REINSTALLATION THE FOLLOWING SEASON.

ALTERNATIVE PROCEDURES (REFER TO CITY OF OTTAWA).

1. POLES AT BEACH AND LAND LOCATIONS MAY REMAIN IN PLACE YEAR-ROUND.
2. STEEL SLEEVE INSERTS MAY REMAIN IN SLEEVES OVER WINTER, BUT ARE REMOVABLE TO FACILITATE CLEANING DURING POLE INSTALLATION.

Attachment D

Species Hazard Ranking

DILLON
CONSULTING

Appendix D – Species Hazard Ranking

US / Canada Hazard Ranking Comparison

Species (Group)	Hazard Rank (USDA / FAA[1])	Hazard Rank (CAR's 322.302)	Hazard Rank (TP 11500)	Mass Rank (by kg)
White-tailed Deer	1	1	1*	1
Vultures	2	18	16	14
Geese (Swans)	3	2	1	3
Cranes	4	10	8	8
Osprey	5	n/a	n/a	7
Pelicans	6	n/a	n/a	5
Ducks	7	5	4	11
Hawks (buteos)	8	4	3	13
Eagles	9	9	7	6
Rock Dove	10	8	6	17
Gulls	11	3	2	15
Herons	12	17	15	9
Mourning Doves	13	16	14	19
Owls	14	7	5	12
Coyote	15	6	2*	2
American Kestrel	16	19	17	18
Shorebirds	17	12	10	21
Crows - Ravens	18	14	12	16
Blackbirds / E. Starling	19	13	11	20
Sparrows	20	11	9	22
Swallows	21	15	13	23
Wild Turkeys	n/a	20	n/a	4
Cormorants	n/a	21	n/a	10

(n/a - not assigned a hazard ranking)

*(TP11500 ranks birds and mammals separately)

Species (Group) (USDA / FAA)	Damage Ranking	Major Damage Ranking	Effect on Flight Ranking	Composite Ranking	Relative Hazard Score
White-tailed Deer	1	1	1	1	100
Vultures	2	2	2	2	63
Geese (Swans)	3	3	4	3	52
Cranes	4	4	7	4	48
Osprey	6	5	3	5	50
Pelicans	5	7	5	6	44
Ducks	7	6	8	7	37
Hawks (buteos)	9	13	10	8	25
Eagles	8	15	9	9	31
Rock Dove	11	8	11	10	24
Gulls	10	11	13	11	22
Herons	12	14	12	12	22
Mourning Doves	14	9	17	13	17
Owls	13	12	19	14	16
Coyote	15	17	6	15	20
American Kestrel	16	10	16	16	14
Shorebirds	17	19	14	17	12
Crows - Ravens	18	16	15	18	12
Blackbirds / E. Starling	19	18	18	19	9
Sparrows	20	21	290	20	4
Swallows	21	20	21	21	2

[1] As prescribed by Dr. Richard Dolbeer, USDA for US Federal Aviation Administration