

VII. FACILITIES AND INFRASTRUCTURE



AMERICAN BADGER

Facilities and Infrastructure

The 2025 Master Plan proposes significant changes to the site infrastructure, servicing, and utilities at the Edmonton Valley Zoo (EVZ). As part of the implementation planning, consideration has been made to the sequencing of projects, particularly in understanding the impacts of development to downstream utilities that are required before a project can commence.

The Master Plan's operational requirements ensure efficient site keeping and maintenance year-round. The Plan also incorporates City of Edmonton initiatives and policies on sustainability, climate resiliency, and wildlife-friendly design, in alignment with the EVZ strategic objectives for operational excellence and conservation.



BLACK-FOOTED FERRET

Existing Infrastructure

The Master Plan identifies a number of public and operational buildings as well as parallel play areas that are to be retained or renovated as part of the Master Plan phasing. Complete information on all existing buildings and their future plans is available in Appendix C.

RETAINED INFRASTRUCTURE

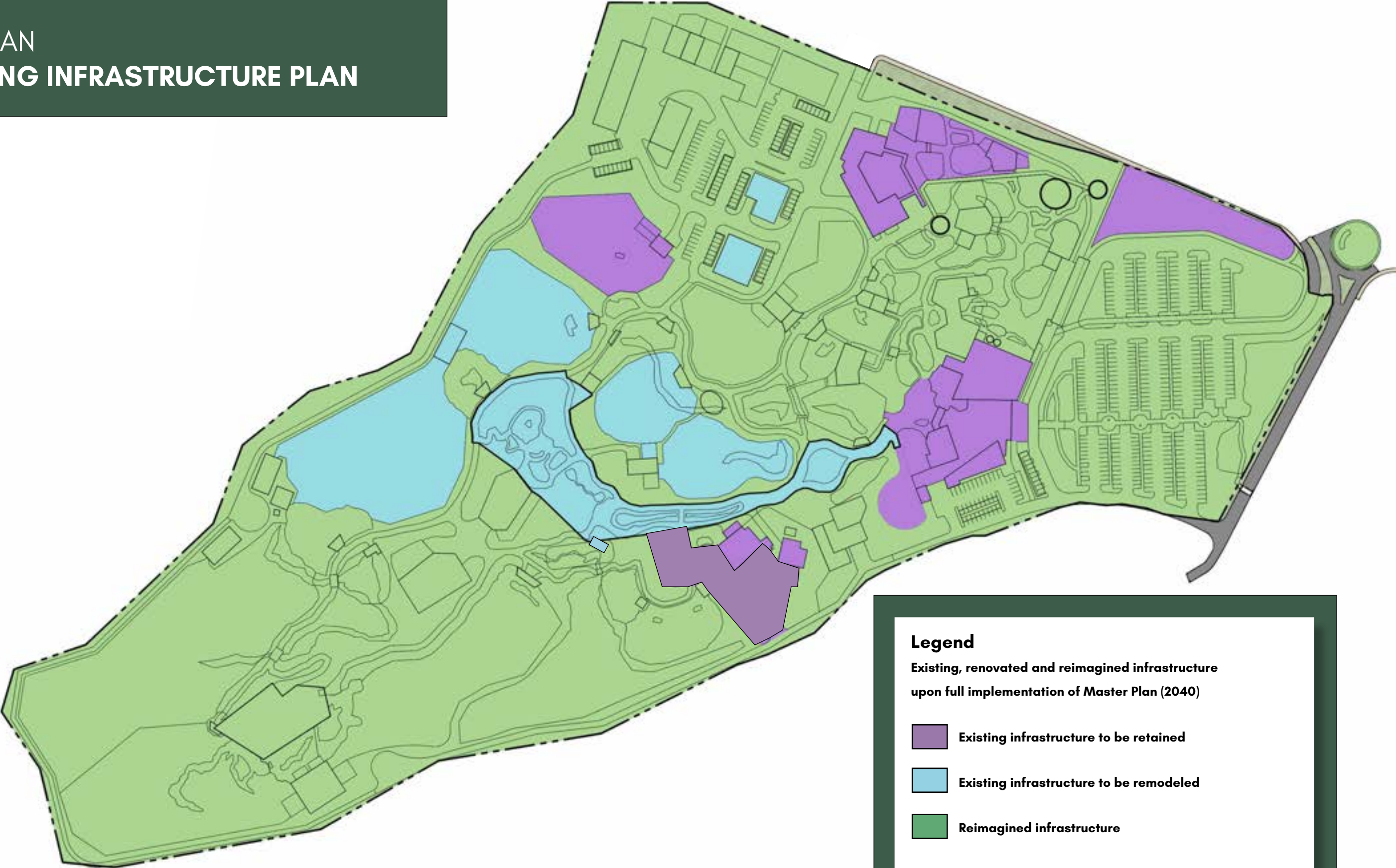
There are several relatively new buildings built between 2007 and 2019 that continue to function efficiently and contain elements that will complement new construction. The following structures currently have a good or excellent condition rating and will be retained: Lemur Exhibit/Makira Outpost (2007); Education Centre Ed-Venture Lodge (2013); Plaza Café and Washrooms (2014); Plaza Store and Ticketing (2014); Otter Exhibit (2014); Wildlife Amphitheatre (2016); Pinneped Winter Retreat and Pinneped Filtration Building (2011), Urban Farm Building A (2019) and Red Panda Building B (2019). The new Arctic Wolf Exhibit will also be retained through future phases of construction.

The Master Plan also identifies operational or administrative structures that continue to serve zoo functions. The following will be retained but are planned to either undergo major renovation or require upgrades to ensure efficient and safe functionality: Saito Centre (1984); Hayshed (1980); Metre/Storage Shed (1959); Trout Filtration Building (2014); and the Secondary Water Main Building (2019).

There are three Parallel Play structures to be retained for future use and enjoyment of the public and these include: Red Panda PP (2019); Meltwater PP (2014); and Beaver PP (2014). The Plaza and associated sculptures built in 2014 will also be left in place and the historically significant Carousel (1959) will be retained and relocated to an indoor space during the Nature Learn and Play phase.

There are several structures that will be renovated in initial phases but ultimately removed upon completion of the Master Plan phasing. The Elephant Building/Exhibit (1999) is to be renovated and expanded in the Enclosure Renewal project and then replaced in the Amur River Phase and the following habitats will be renovated for interim use and then removed during the Amur River Phase: Snow Leopard; Lynx; Red Fox and Wolf.

SITE PLAN
EXISTING INFRASTRUCTURE PLAN



Legend
Existing, renovated and reimagined infrastructure
upon full implementation of Master Plan (2040)

- Existing infrastructure to be retained
- Existing infrastructure to be remodeled
- Reimagined infrastructure

NOT TO SCALE

Engineering Reports

The Edmonton Valley Zoo is a complex site that has undergone many phases of development in its lifetime, resulting in a mix of old, new, abandoned and unknown infrastructure across the site. The Master Plan reflects the information available regarding utilities, services, trees, topography and site infrastructure, but this information is not current. Historical surveys are informative but are only a snapshot of a particular time and date. Before commencing with any projects, it is recommended that the Edmonton Valley Zoo contract a comprehensive survey to fully understand existing conditions including topography, infrastructure, utilities, existing trees, and other built components.

The following pages contain the reports, drawings, and recommendations from the civil, mechanical, and electrical engineering teams. Further information on calculations is available in Appendix E.

UTILITIES

An updated survey and conditions assessment of existing site utilities will support the planning, design, and construction of utility renewals and expansions for watermain, storm sewers, sanitary sewers, gas lines, power lines and infrastructure, communications, and lighting. A watermain survey will allow engineers to finalize the required expansion to service new enclosures. It will also identify the location of all on-site fire hydrants to review the existing level of fire protection to determine if deficiencies are present. Survey of storm and sanitary sewer will provide critical information such as the locations, pipe lengths, invert depths, and sewer size. This information will help refine the required sewer upgrades and sewer renewals for additional enclosures. Similarly, a survey of power and gas utilities will determine if the existing systems have enough capacity to support additional development within the Zoo and how much additional utility construction may be needed.

SITE INFRASTRUCTURE AND TOPOGRAPHY

An updated survey will accurately reflect the current site infrastructure, capturing any changes made since the previous survey as the EVZ continues to develop. This updated survey will document the locations of all existing roads, trails, fences, buildings, and other built assets. A topographic survey documents the existing elevations of the site, which allows for analysis of potential constraints, and necessary overland drainage routes. Understanding the existing elevations on site is critical to inform the design of new structures and accessible pathways throughout the Zoo as well as ensuring that proposed grades integrate seamlessly with existing conditions.

The survey will also include an inventory of trees within the EVZ, enabling project teams to determine which trees should be preserved or removed for upcoming projects. Additional details on tree removal requirements are provided in the Urban Forestry section.



The Edmonton Valley Zoo Master Plan Civil Engineering Report reviews stormwater management across the site including storm sewers, stormwater management facilities including Low-Impact Development (LID) facilities, sanity sewers, and watermains.

STORMWATER MANAGEMENT

The EVZ’s stormwater management systems consist of a network of structures and pipes that capture and convey stormwater. The stormwater management plans reflect a 1 in 100 storm event.

The EVZ’s existing stormwater management system consists of a network of above-ground structures and underground pipes that capture and convey stormwater. Effective stormwater management at the Zoo requires the delineation of major overland drainage catchment areas. Based on the existing sewer network and the existing topography, the EVZ can be divided into a north catchment and a south catchment (see diagram on next page).

The north catchment basin has a storm service connection from the north end of the parking lot to the stormwater conveyance infrastructure beneath Buena Vista Road, and a second service connection at the south end of the parking lot that connects to drainage infrastructure beneath Sir Wilfrid Laurier Park. Both connections convey water to the same stormwater outfall structure in the North Saskatchewan River. The south basin conveys stormwater to a storm pond for temporary detention. In summary, the EVZ currently uses conventional stormwater management techniques to manage stormwater.

The north catchment basin is 122,635 m2 in size and generates 7,991 m3 of runoff in the 1 in 100-year storm event based on the 4-hour Chicago Distribution (per ‘Storm Water Analysis-North Basin’, included within Appendix E). The catchment’s lowest point is the parking lot. A stormwater retention pond will be constructed next to the parking lot to store 2,786 m3 of runoff.

The approximate size of the storm pond is 2,302 m2 and will require 4:1 side slope through the active storage zones due to spatial constraints. The pond’s normal water depth, highwater depth, and freeboard are 1.0m, 3.0m, and 0.3m respectively. The storm pond alone cannot meet the stormwater management requirements, therefore the basin will require additional storage. A Low Impact Development (LID) facility is proposed to support the construction of the parking lot by providing 2,500 m3 of stormwater storage and larger soil volumes to grow trees within the parking lot. Additionally, an underground storage tank with a 1,650 m2 footprint and a 1.6m depth to store 2,640 m3 of stormwater is proposed to achieve the required storage volume. These stormwater storage volumes total to 7,926 m3 which is 65 m3 less than the required volume. This volume can be made up in surface stormwater storage improvements in the parking lot and in enhancements to storm sewer pipes and structures.

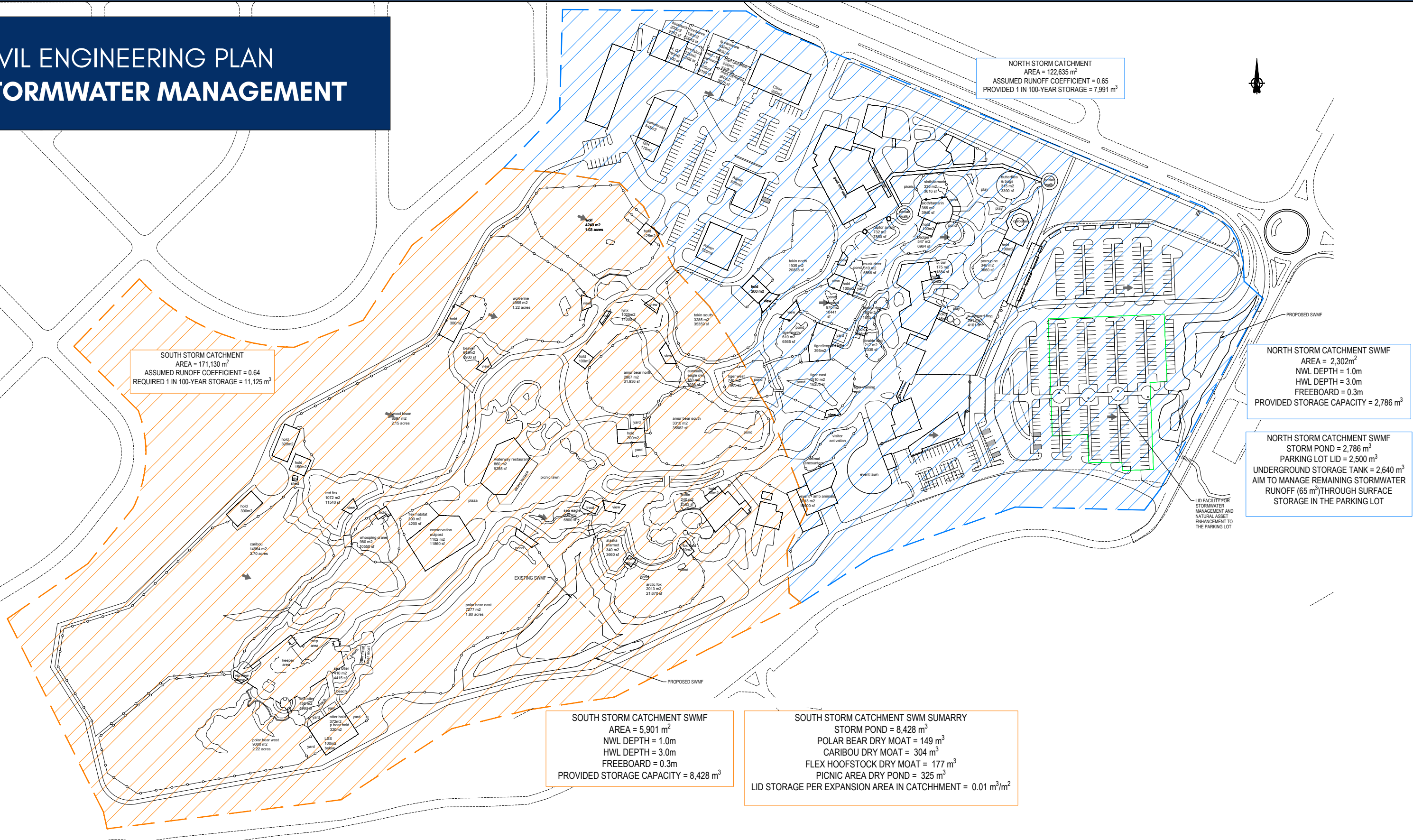
The south catchment is 171,130 m2 in size and generates 11,125 m3 of runoff in the 1 in 100-year storm event based on the 4-hour Chicago Distribution (per ‘Storm Water Analysis-South Basin’, included within Appendix E). The north and south catchments are delineated on the drawing 720-002-SWM in blue and orange respectively. The existing stormwater retention pond will be enlarged to accommodate the anticipated increase in stormwater runoff. Due to spatial constraints, the approximate size of the storm pond is 5,901 m2 and will require 4:1 side slope through the active storage zones to store 8,428 m3 of runoff. The pond normal water depth, highwater depth, and freeboard are 1.0m, 3.0m, and 0.3m respectively.

The storm pond alone cannot meet the stormwater management requirements so to help achieve the stormwater management requirements of the south basin additional elements including a dry pond in the picnic area and three dry moats in the polar bear enclosure, caribou enclosure, and the wood bison enclosure are recommended. The combined storage of these temporarily inundated areas is 955 m3 of stormwater storage, and calculations are included within their respective ‘Storm Water Analysis’ tables included within Appendix E.

The catchment is still deficient in stormwater storage quantity by 1,742 m3. Additional storage locations will be identified throughout the catchment as Zoo expansion occurs. Based on the ratio of 1,742 m3 of stormwater storage to the catchment area of 171,130 m2, all expansions or new developments in the south catchment will be required to store an additional 0.01 m3 for every 1 m2 of developed space. This storage volume can be achieved by using LID facilities throughout the Zoo and does not require construction of all new stormwater management infrastructure prior to developing animal enclosures and facilities. Enclosures’ storage volumes may be condensed into fewer collection points that are optimal for animal welfare and financial efficiency, however each stage that develops the Zoo south catchment should address the 0.01m³/m² requirement.

CIVIL ENGINEERING PLAN

STORMWATER MANAGEMENT



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LOW-IMPACT DEVELOPMENT (LID) FACILITIES

To overcome the challenges of stormwater storage for such a large area, it is recommended that sustainable and LID solutions be used alongside conventional stormwater management techniques to achieve the necessary stormwater storage requirements.

LOW-IMPACT DEVELOPMENT (LID) FACILITIES

These solutions make use of the following principles:

- Restoring and/or maintaining the natural hydrology of drainage basins.
- Sustainable land use
- Climate and flood resilience

Restoring the natural hydrology of drainage basins includes slowing down the conveyance of water through natural infrastructure, increasing the pervious area of catchments, and spreading stormwater storage throughout the basin to reduce the risk of flooding. Utilizing natural hydrological processes that filter pollutants and sediments from the stormwater such as infiltration, evaporation, and absorption of water by vegetation will provide water quality benefits.

Constructing a single stormwater management facility to store the entire basin’s worth of stormwater would take a significant footprint of land away from the experience at the Zoo. Pockets of stormwater storage in LID facilities combined with conventional stormwater management facilities will provide opportunities to optimize the land use to meet the vision of the Master Plan.

LID FACILITIES INCLUDE:

- Natural Buffers: Create vegetative buffers using native shrubs and grasses around water bodies to improve water quality and reduce erosion.
- Rain Gardens: Install rain gardens planted with native vegetation to capture and filter stormwater runoff. These can be located near parking lots, sidewalks, or building perimeters.
- Bioswales: Use vegetated, gently sloped ditches to direct and treat stormwater. Plant them with native grasses and wildflowers for aesthetic appeal and functionality.
- Permeable Pavements: Use permeable pavers in high-traffic areas like entry plazas, parking lots, and pathways to reduce runoff while maintaining accessibility.
- Green Roofs: Install a green roof with hardy native sedums and/or grasses to improve insulation, reduce runoff, and provide habitat for wildlife.
- Retention Ponds: Design stormwater retention or detention ponds with native aquatic plants like cattails and sedges to enhance biodiversity and improve water quality and create habitats for waterfowl and amphibians. Plants native aquatic species like arrowhead and horsetail along pond edges.
- Tree Canopy: Incorporate native trees such as white spruce or balsam poplar to provide shade, improve air quality, and reduce urban heat island effects.
- Soil Vaults: Install soil vaults to reach City of Edmonton minimum soil volumes and to retain stormwater in areas of constraint with large impermeable adjacent surface areas.



PRECEDENT IMAGE: BOARDWALK OVER BIOSWALES

CIVIL ENGINEERING REPORT
CONTINUED

STORM SEWER ANALYSIS

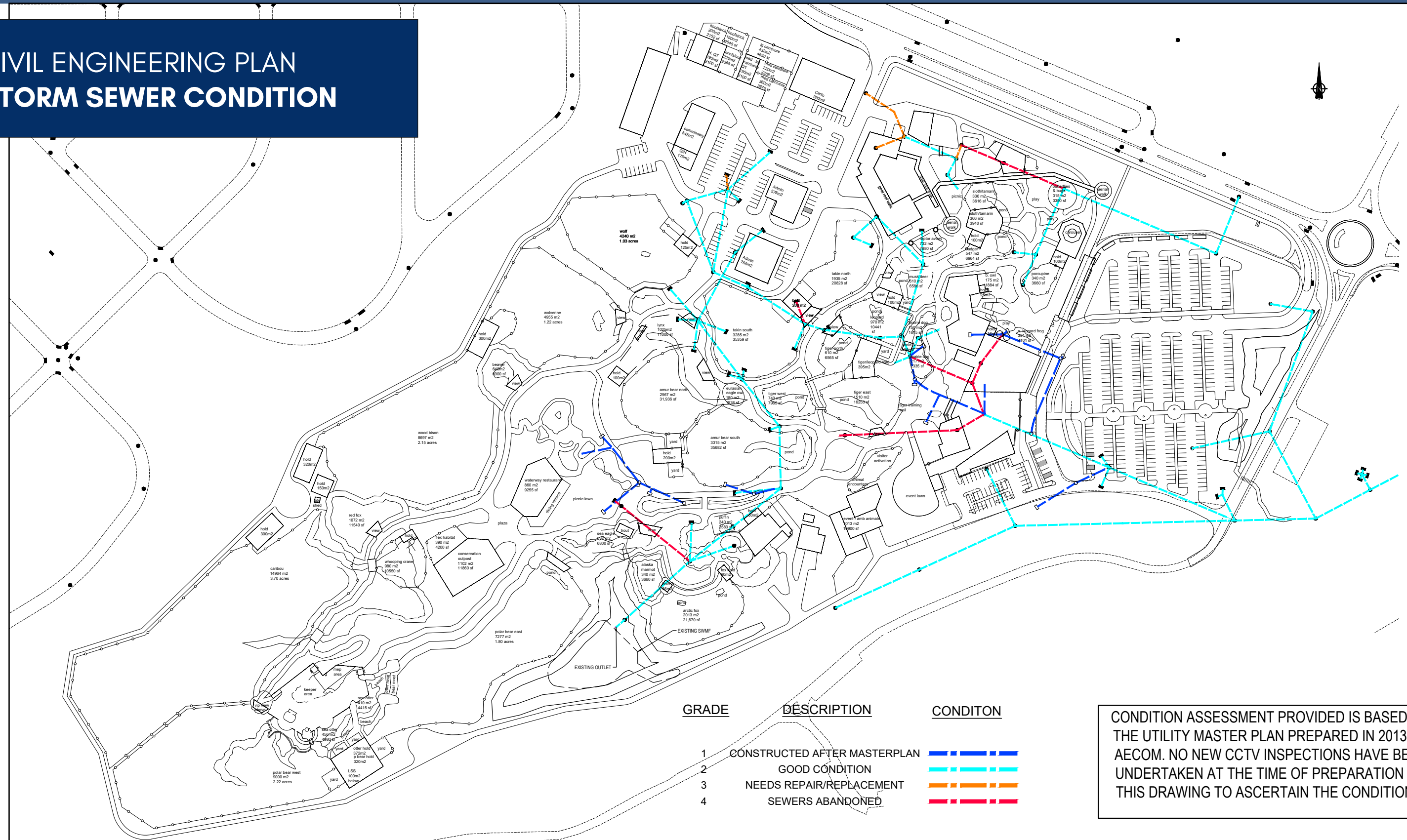
The storm sewer analysis consists of a storm sewer condition assessment plan (see next page.) and developing a storm sewer plan (see page 136). The storm sewer plan includes all existing storm sewer utilities from background documents and drawing files. The network of storm sewers is reflective of what infrastructure is currently in place at the EVZ including manholes, catch basins, sewer pipes and the existing stormwater management facility. The plan distinguishes between existing infrastructure before and after the 2013 Utility Master Plan to understand what sewer expansions were undertaken over the last 12 years. The sewer plan also includes the sewer and stormwater storage facilities expansions required to support the full development of the EVZ. The storm sewer condition assessment plan highlights the condition of the sewers and provides a grade between 1 and 4 as per the following table:

Grade	Condition
1	Sewer has been constructed after the 2013 Utility Master Plan was completed.
2	Good Condition. No reported issues with the sewer.
3	Needs repair or replacement at the time of the 2013 Utility Master Plan.
4	Abandoned sewer that is no longer in service.

All condition assessments are based on the 2013 Utility Master Plan. No new utility assessments have been conducted since the completion of the 2013 Utility Master Plan.

CIVIL ENGINEERING PLAN

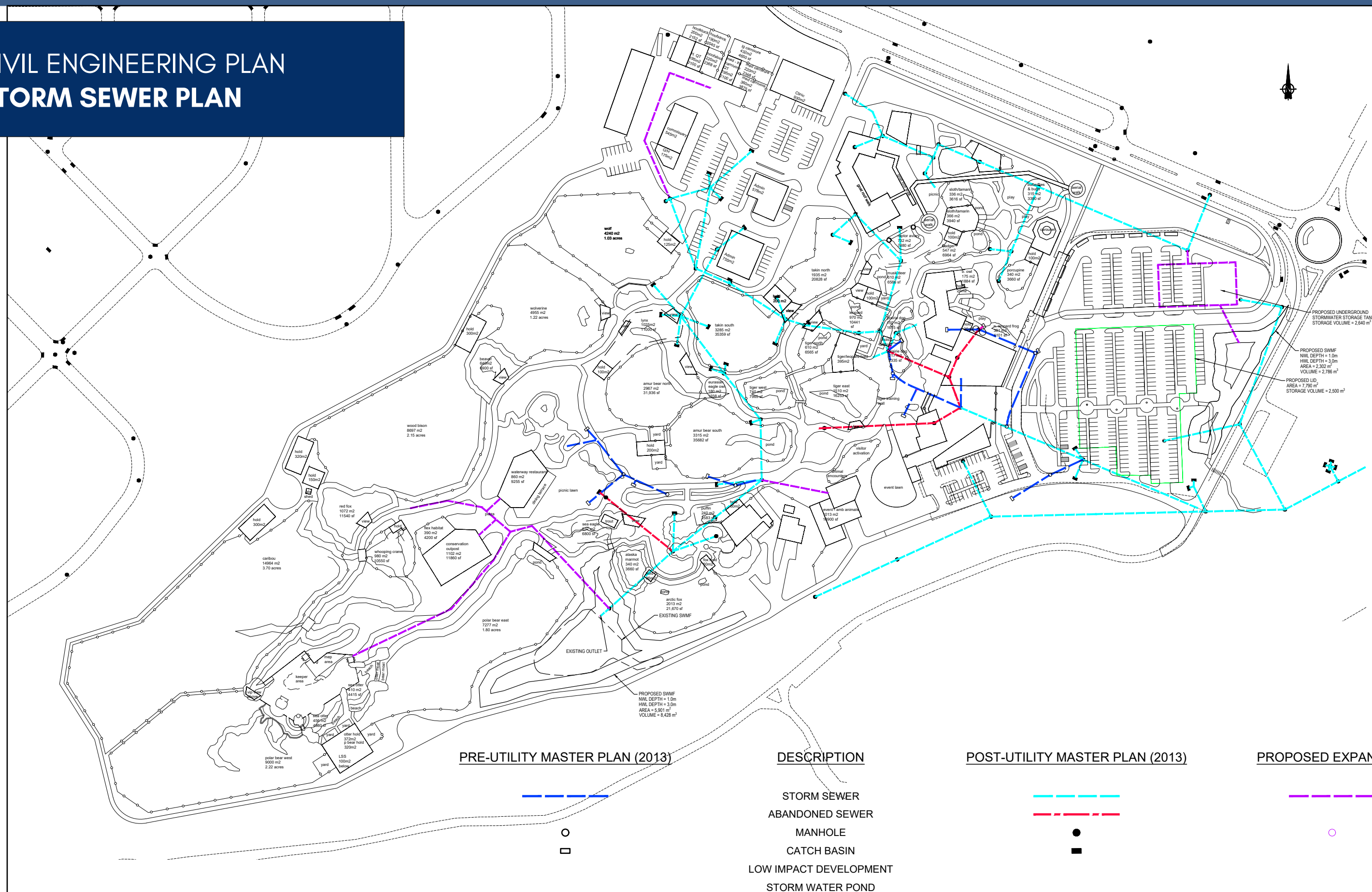
STORM SEWER CONDITION



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CIVIL ENGINEERING PLAN

STORM SEWER PLAN



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CIVIL ENGINEERING REPORT
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SANITARY SEWER ANALYSIS

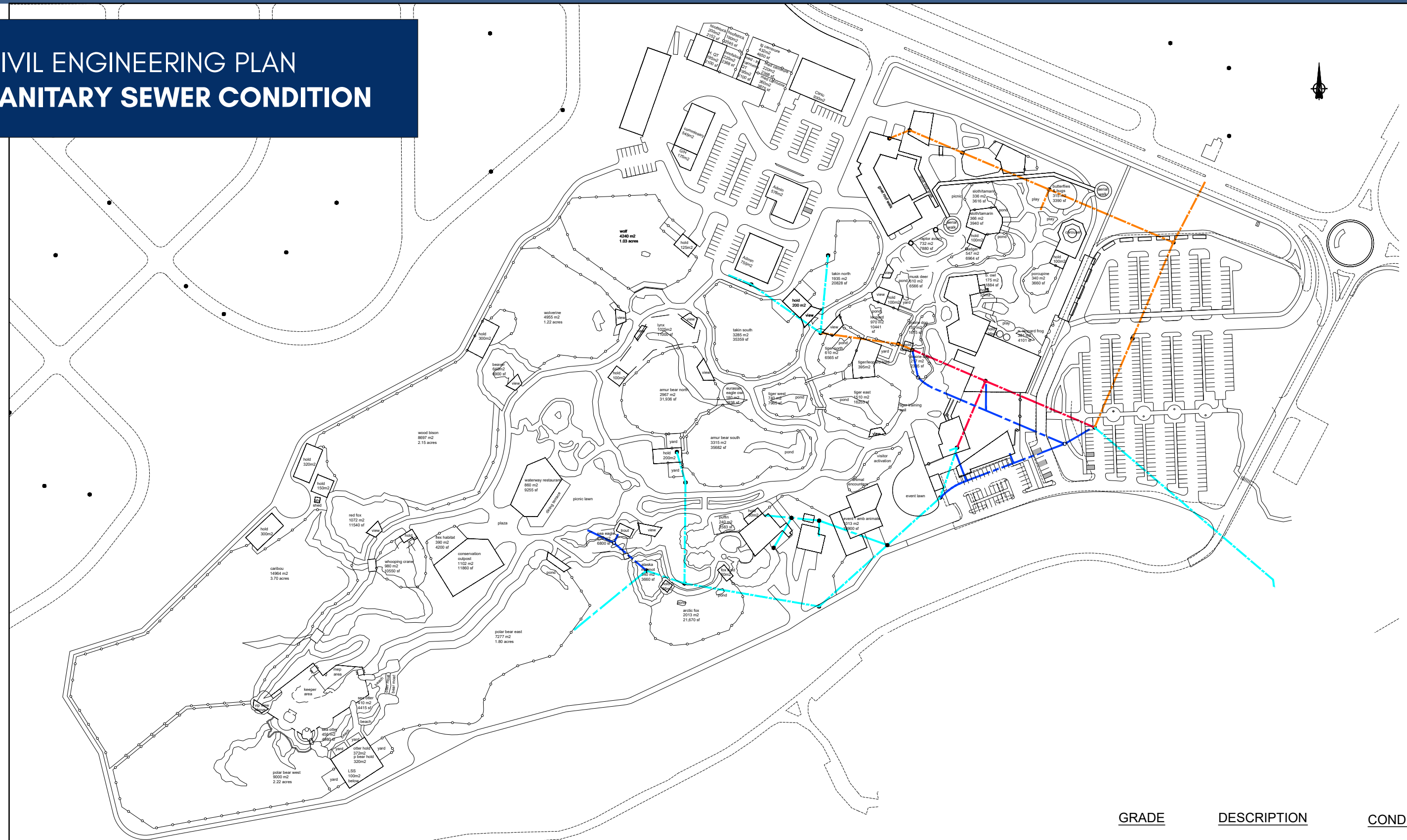
The sanitary sewer analysis consists of a sanitary sewer condition assessment plan (see next page) and developing a sanitary sewer plan (see page 139). The sanitary sewer plan includes all existing sanitary sewer utilities from background documents and drawing files. The network of sanitary sewers is reflective of what infrastructure is currently in place at the EVZ including manholes and sewer pipes. The plan distinguishes between existing infrastructure before and after the 2013 Utility Master Plan to understand what sewer expansions were undertaken over the last 12 years. The sewer plan also identifies required sewer expansions for the full development of the EVZ. The sanitary sewer condition assessment plan highlights the condition of the sewers and provides a grade between 1 and 4 as per the following table:

Grade	Condition
1	Sewer has been constructed after the 2013 Utility Master Plan was completed.
2	Good Condition. No reported issues with the sewer.
3	Needs repair or replacement at the time of the 2013 Utility Master Plan.
4	Abandoned sewer that is no longer in service.

All condition assessments are based on the 2013 Utility Master Plan. No new utility assessments have been conducted since the completion of the 2013 Utility Master Plan.

CIVIL ENGINEERING PLAN

SANITARY SEWER CONDITION

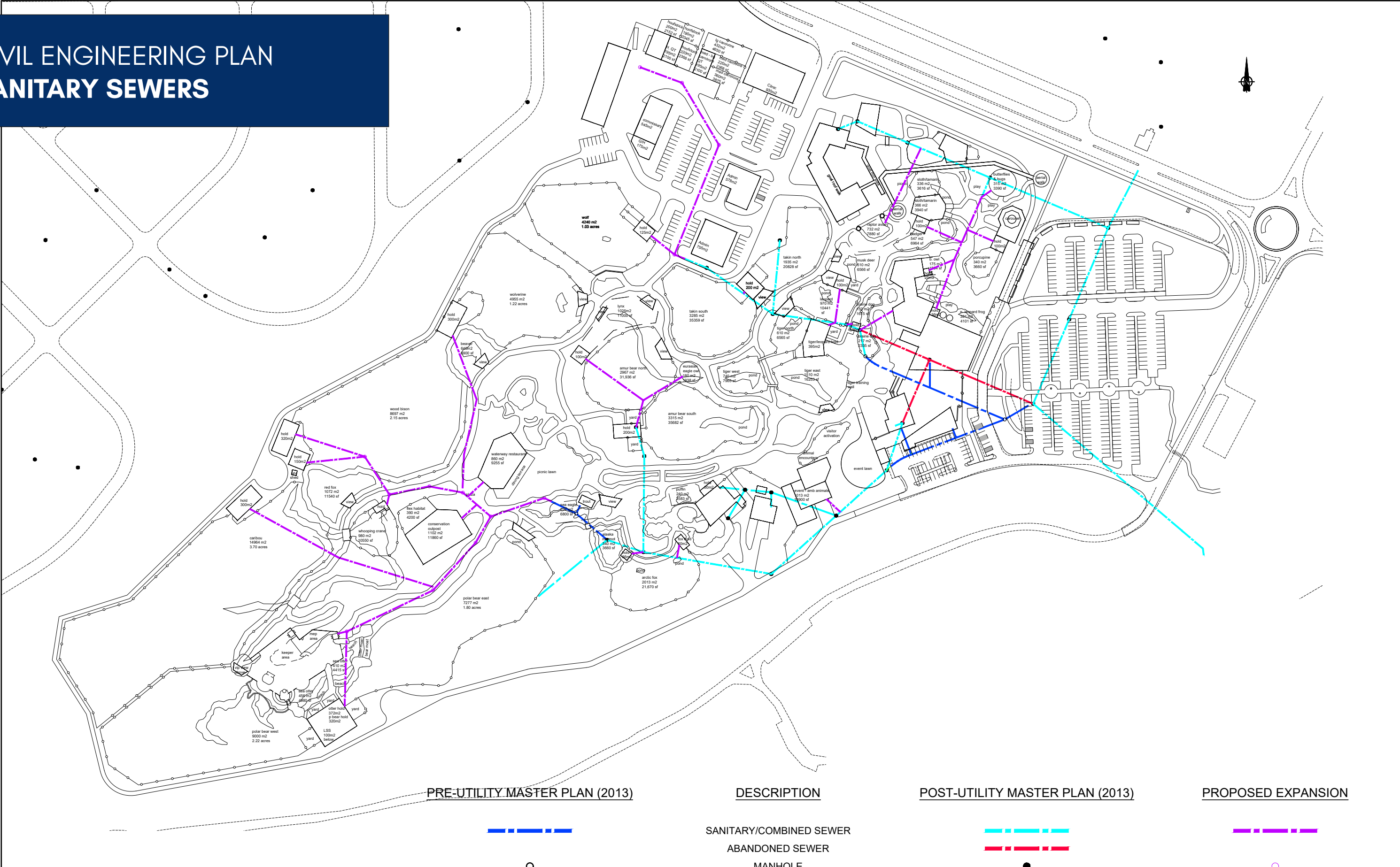


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<u>GRADE</u>	<u>DESCRIPTION</u>	<u>CONDITON</u>
1	CONSTRUCTED AFTER MASTERPLAN	
2	GOOD CONDITION	
3	NEEDS REPAIR/REPLACEMENT	
4	SEWERS ABANDONED	

CIVIL ENGINEERING PLAN

SANITARY SEWERS



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CIVIL ENGINEERING REPORT
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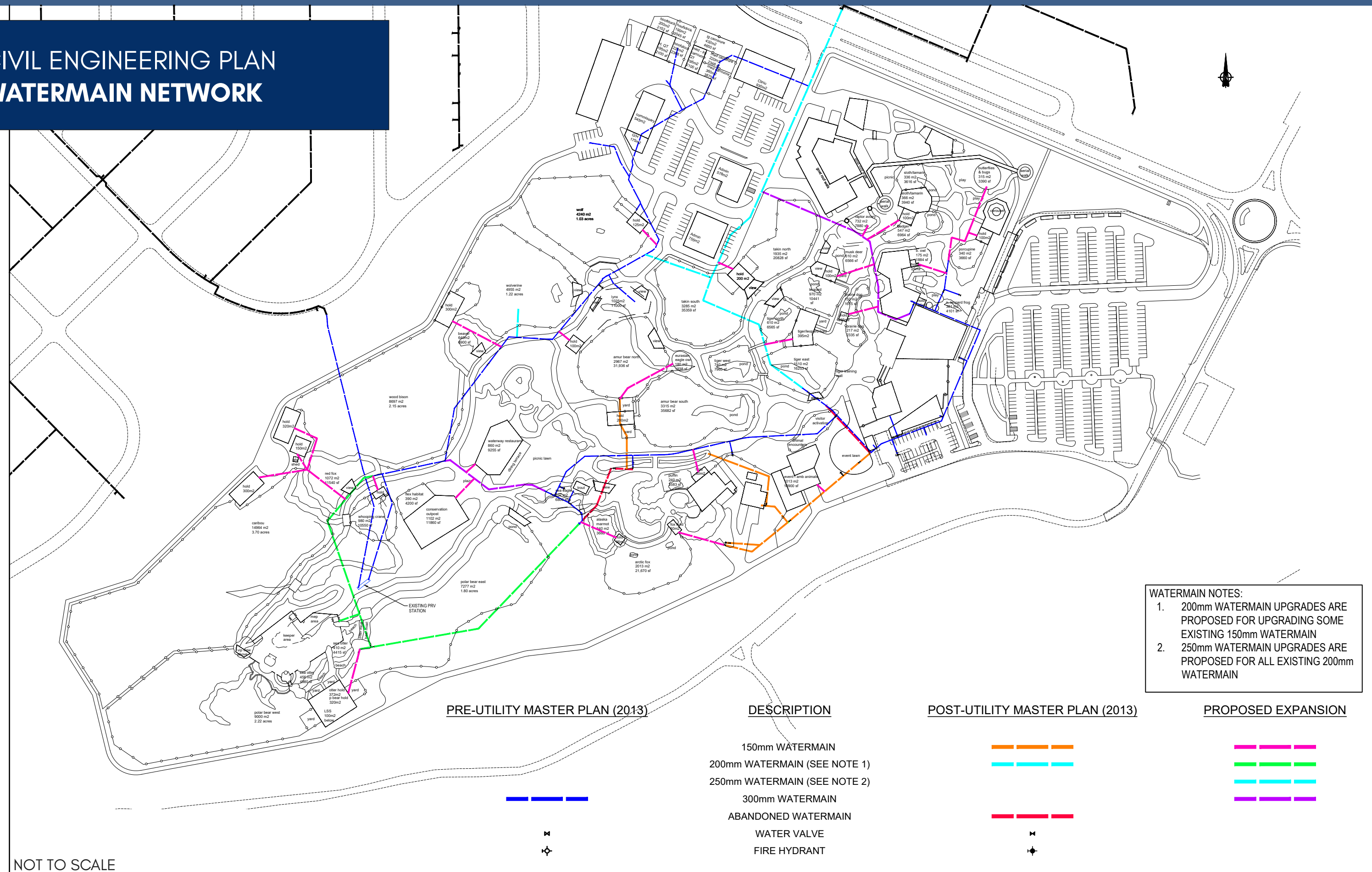
WATERMAIN ANALYSIS

The watermain analysis consists of a single drawing (see next page) that identifies all the existing watermains throughout the EVZ including their size. The plan also identifies the new and upgraded watermains required to support all new Zoo development with consideration of required fire protection flows.



CIVIL ENGINEERING PLAN

WATERMAIN NETWORK



The Mechanical Engineering Report shows the EVZ site natural gas main distribution downstream from the utility metre, in the form of a looped main concept following walking paths and sized for future load allowances. The report assessed the cost implications to implement the loop, aligning with the phasing plan explored later in this document. This review excluded detailed design, detailed phasing, and branch connections to individual buildings.

NATURAL GAS CAPACITY

The EVZ is serviced by a private natural gas service that is connected to the utility distribution managed by ATCO. The service consists of buried HDPE piping which delivers natural gas around to complex and serves 17 existing site buildings. The existing natural gas service enters the site adjacent to the service entrance off Buena Vista road. The utility meter and regulator is in a fenced enclosure. The regulator is a Fischer 133H configured with a spring that provides adjustable pressure from 2-5 psi; markings on secondary regulators found throughout the site indicate 4 psi delivery pressure is used within the site distribution to the various buildings.

After the utility regulator, the gas drops below grade at a size of 6” (150mm). At each building, a typical configuration is for building regulators to step down this pressure to 2psi outside the building, with downstream regulators in mechanical rooms further reducing the pressure to the range required at individual appliances or groups of appliances.

Existing gas loads have been estimated from a mix of recent (typically 2021) building condition assessment information, existing drawings, and review of site. The total existing site gas load is estimated to be approximately 23,000MBH. This includes existing buildings that are currently served by propane, which may be converted to natural gas.

NATURAL GAS CAPACITY - FUTURE

The future gas loads have been estimated on a per-square-foot basis, based on comparison to existing buildings. Additionally, several allowances have been made for major equipment and kitchen equipment, less loads removed from major buildings that will be decommissioned. As the future buildings have not been designed this estimate is very high level and subject to change and must be confirmed in future detailed design phases. This estimate is likely conservative as buildings like the Event center are planned to be LEED Silver, with efficient envelopes and HVAC systems that may lower the square-foot gas loads. However there is also uncertainty in high-load buildings such as the new Clinic, Waterways Multi-Use Venue, and Coastal Arctic Gallery. For the purposes of this master planning, the future total site gas load is estimated to be approximately 55,000MBH.

The planned additions add length to the system, decreasing the available capacity, and introduce major loads further along the system, away from the service entry.

Considering half of the ring main, a single leg of the 6” (150mm) ring main provides approximately 43,700 MBH based on 4psi with 2psi pressure drop and 2400ft (730m) length, calculated according to CSA B149.1 formulas for high pressure distribution and conservatively with a 1.2 fittings factor. With the future planned loads estimated at over 55,000MBH, the single leg is insufficient to accommodate the future expansion and additional infrastructure is required to support the future expansion. To accommodate the planned increase, the ring main consisting of independent service pipes is proposed. This approach will add both capacity and partial redundancy to the system

The site utility regulator may require a change depending on the available street distribution pressure from ATCO but appears sufficient for pressures in excess of 20psi. Coordination with ATCO will be required. An increase in system pressure from 4psi/2psi drop to 5psi/2.5psi drop could be considered in detailed design for greater redundancy, increasing the capacity in each leg to approximately 50,500 MBH. Any changes in the system pressure would require adjustment of the building regulators. Otherwise, keeping the system pressure at 4psi, the meter outlet needs an 8” (200mm) header to serve the two 6”(150mm) legs of the loop. The 8” (200mm) header has a capacity of 92,500 MBH.

PROPOSED NATURAL GAS SERVICING LOOP

The proposed natural gas site distribution in this updated master plan extends the looped gas main concept introduced in the previous 2013 EVZ Utility Master Plan. A looped main provides distribution throughout the site for ease of future connection, increases capacity, and provides a partial but high degree of capacity redundancy to disruptions to any one portion of the line, limited by the placement of isolation valves.

The March 2013 EVZ Utility Master Plan began the introduction of a new looped 6” (150mm) polyethylene gas main concept. Drawing reviews suggest this looped gas main has been partially implemented, with a major portion during site improvements in 2015 VAL156 record drawings.

The proposed redevelopment and westward expansion of major buildings including the Conservation Education Centre, Coastal Arctic Gallery, Waterways Multi-Use Venue, and others will necessitate completion of this concept and extension of the looped main further west. The new loop will generally follow walking paths and the water main.

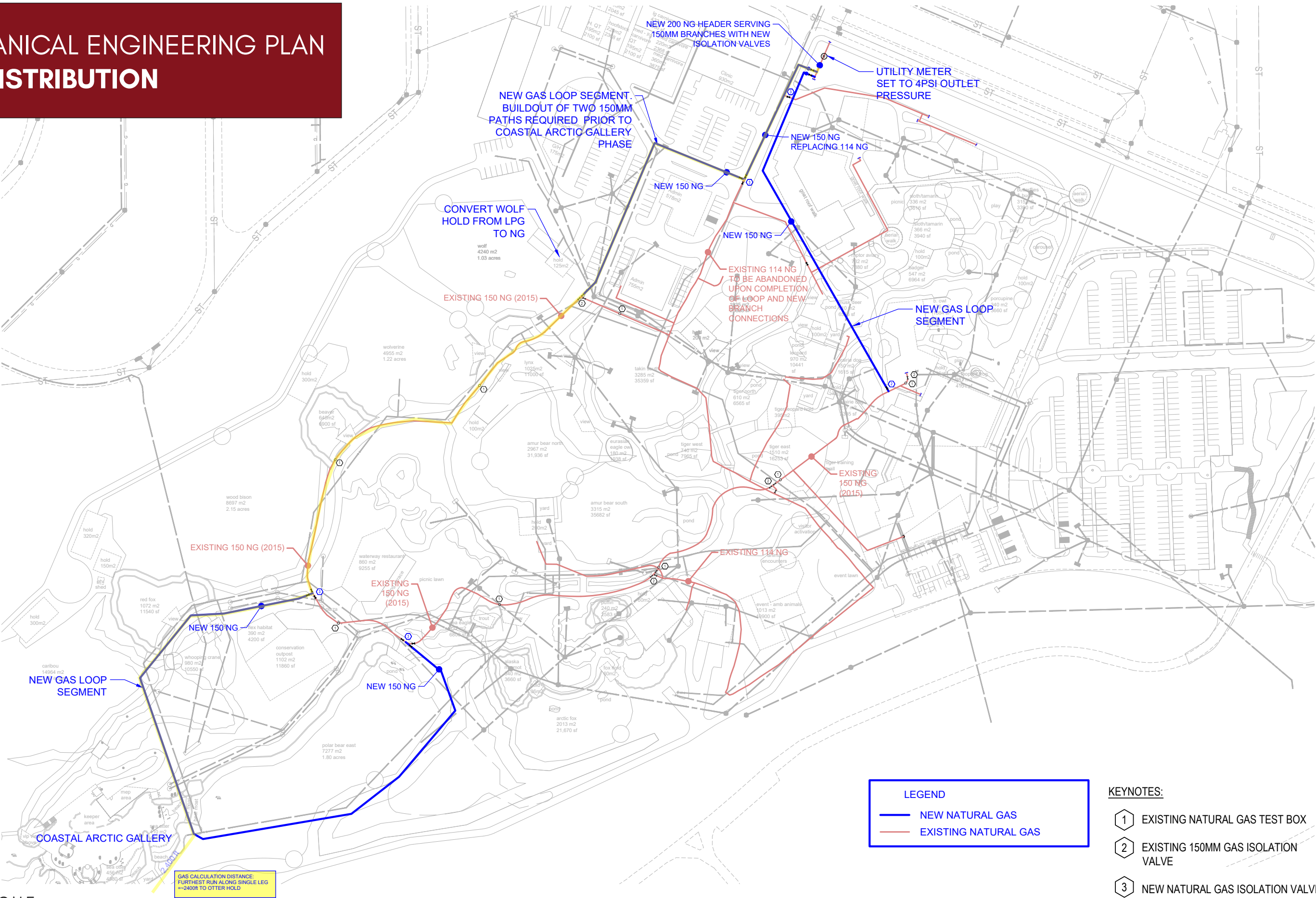
The proposed routing includes completing the loop behind the Saito Centre / future Admin buildings, allowing servicing of buildings in the service/admin area of site, and completion of the east side of the loop to the Education Centre. Depending on the phasing and final detailed design loads of the western buildings, this is likely required to be completed before adequate gas capacity is available for the Coastal Arctic Gallery at the far western extent of the site.



EVZ IMAGE: OUTER ZOO

MECHANICAL ENGINEERING PLAN

GAS DISTRIBUTION



The Electrical Engineering review evaluated the existing power and communications network servicing the Edmonton Valley Zoo campus to develop a master plan for its expansion. This plan will accommodate new phases as defined in this Master Plan document. Additionally, the city has requested an examination of redundancy strategies to ensure that the system remains reliable during outages or faults.

ELECTRICAL ENGINEERING FOCUS

The focus of this report is primarily on the primary electrical network and its immediate expansion needs. Secondary systems, particularly the low voltage networks emerging from transformers, will be designed by individual building engineers and do not influence the overall system expansion strategy.

Key focus points are:

Mapping the Existing Network

- A detailed assessment of the current 15kV primary feeder system is essential, as it forms the backbone of the zoo’s electrical infrastructure.

Expansion Strategy

- The study outlines a phased approach to extend the primary network to service new construction phases while maintaining operational integrity.

Redundancy Options

- Various methods to introduce redundancy, including creating a complete physical loop and implementing backup power solutions are explored.

Communications Network Review

- The existing communications infrastructure (analog/digital telephone systems and distributed fiber networks) was reviewed and integrated into future planning.

Guidance for Future Designers

- The report is structured to provide clear recommendations and considerations for future designers tasked with implementing new phases of the project.

EXISTING SYSTEM - POWER DISTRIBUTION

The EVZ campus currently receives power through a 15kV primary feeder that originates from a meter cabinet and main switching cubicle located off the south side of Buena Vista Road. The electrical network is structured around several key elements. Initially, the primary feeder distributes electricity to six switching cubicles, each of which in turn supplies power to a transformer strategically positioned across the campus. These transformers convert the high-voltage primary supply into a lower voltage that is suitable for building operations. In some cases multiple buildings are fed from the same transformer.

The network is designed as a radial system, following a single, straight pathway without any loop-back options. This configuration means that if a fault occurs in the primary line, it can potentially disrupt power to all downstream transformers—a detail that is illustrated in the connection diagram in Figure 1 (see Appendix E). This diagram is a very simplified version of single line for the site omitting protection devices and transformers.

Despite this limitation, the existing cabling is #2 Aluminium rated for an ampacity of 126A providing a power capacity of 3 MW at 15kV, which exceeds the current connected load. Based on the transformer sizing, the system could potentially demand up to 2.2 MW if all transformers were operated at maximum load; however, historical system demand is likely below this (pending confirmation from EPCOR).

There are also notable variations in the installation methods across the site. Installations carried out after 2012 (Urban Farm, Entry/Wander, Piniped) feature a single 4-inch conduit for the primary network, while those built prior to 2012 utilize direct-buried cables, which may require upgrading.

EXISTING SYSTEM - COMMUNICATIONS

The communications network at the zoo is a hybrid system that supports both analog and digital telephone services, along with high-speed internet via distributed fiber.

Key elements include:

Telephone Services

- A mix of analog and digital telephone services are delivered via the cubicles. These systems ensure continuous communication across the campus.

Fiber Optic Distribution

- Dedicated fiber lines extend from a centralized hub to several communication distribution panels located in major buildings, such as the education centre. These panels serve as critical nodes for the distribution of internet and data services.

Service Providers

- The site benefits from a robust mix of service providers including the Edmonton City Fibre Network, Shaw, and Telus, ensuring a diverse and resilient communications infrastructure.

ELECTRICAL ENGINEERING REPORT

PROPOSED EXPANSION PLAN

The expansion plan is designed to be executed in multiple phases in parallel with the zoo’s development schedule.

The key aspects of the routing plan include:

Phased Build-Out: The expansion will occur gradually, ensuring minimal disruption to current operations. Each phase will incrementally integrate new sections of the network as the zoo’s development progresses.

Loop Formation: The complete build-out aims to establish a Ring Main primary network that follows the existing roadways and pedestrian pathways. This design avoids routing through areas designated for new animal enclosures and provides a backup pathway in case of a fault. In Figure 2 (see Appendix E) the connection diagram is revised to show the final build out of the primary loop (new equipment shown in pink).

NEW SYSTEM CONFIGURATION

To support the planned expansion and ensure long-term reliability, the new configuration will include:

Duct Bank Design

- All new primary loop pathways will consist of a 2x2 duct bank, incorporating 4-inch PVC ducts separated by spacers and direct buried. This configuration facilitates future cable replacements without the need for extensive excavation and provides extra conduits for additional cables if needed.

System capacity

- New power cable will be sized at 1/0 AL providing up to 3.8 MW system capacity when the loop is completed.

Communications Conduits

- Two extra 4-inch conduits will be dedicated to communications cabling, ensuring that the high-speed network can be seamlessly integrated and easily expanded.

Pull Box Placement

- While the exact spacing and locations are to be determined, it is anticipated that pull boxes will be installed at regular intervals along the route to aid in cable pulling and maintenance operations.

Upgrading Existing Infrastructure

- In areas where the existing network features only a single conduit, upgrades to the 4-pipe duct bank standard will be implemented as part of the phased expansion.



EVZ IMAGE: PEACOCK

REDUNDANCY PATHWAYS

To enhance the resilience of the electrical system, several redundancy measures can be integrated into the design.

When the build-out is complete, a continuous physical loop (Ring Main loop) will be established. This method is highly effective because it provides a dedicated, self-contained pathway that automatically reroutes power in the event of a fault. One of the primary advantages is its reliability; a complete loop ensures that if one section of the network fails, power can be supplied from the opposite direction, minimizing downtime. However, creating a full physical loop requires substantial upfront investment and extensive planning to integrate seamlessly with the existing infrastructure, making it both time-consuming and costly.

In addition to the complete physical loop, there is an option to implement a collapsed loop redundancy strategy before the full loop is in place. This design approach interconnects multiple feeders, creating alternative pathways for power distribution if one segment fails. The major benefit of collapsed loop redundancy is that it can be deployed incrementally and more rapidly, providing interim backup during the transitional phase of the build-out. Although this method is less resource-intensive than a full physical loop, it may not offer the same level of fault isolation or robustness, potentially leaving parts of the network more vulnerable in the event of multiple simultaneous failures.

To further enhance system resilience, low voltage generators can be installed at critical buildings. These generators provide immediate, localized backup power to ensure operational continuity during outages. This approach offers a rapid response during emergencies, though it generally covers only a portion of the network. Additionally, ongoing

maintenance and fuel costs are considerations that must be factored into the overall design and operational budget.

Expanding the primary metering switchgear and incorporating an additional substation feed can add another layer of redundancy to the system. This strategy facilitates smoother transitions during planned maintenance or unexpected failures by enhancing monitoring capabilities and isolating faults more efficiently. While these upgrades increase system robustness, they also introduce added complexity in coordination with external utilities and require careful synchronization to ensure harmonious operation during switching events. There would also be considerable cost to provide a new feeder from the substation.

Collectively, these redundancy measures can offer a comprehensive approach to improving system reliability. The full physical loop serves as the cornerstone of the long-term strategy, while the option for collapsed loop redundancy provides a practical interim solution. When combined with backup power generation and possibly an enhanced metering and substation feed capabilities, these measures ensure that the electrical system remains robust, flexible, and capable of supporting the evolving needs of the EVZ site.

FUTURE WORK

Future designers responsible for subsequent phases of the network expansion will need to undertake the following tasks:

- Capacity Assessment
- Analyze historical usage data to validate the current system’s capacity and identify any potential shortfalls.

- Infrastructure routing confirmation
- The existing primary loop routing is approximate and requires precise location verification. This can be achieved by temporarily shutting down segments of the network to facilitate line toning and exact identification of buried infrastructure. It is recommended that this work be conducted site-wide. Additionally, if secondary feeds serve buildings in the project area with unknown routing, this work may need to extend beyond the primary loop.

- Tie-In Point Determination and Upgrade Recommendations:
- Identify optimal tie-in points with the existing network for each development phase.
 - Discuss potential upgrades with the city, particularly for portions of the loop that fall outside the immediate phase, based on budgetary considerations and redundancy needs.

- Communications Network Integration:
- Identify nearest communications tie-in points to extend the fiber network.
 - Develop detailed plans for new fiber pull routes, including HUB and splice point designs to ensure a seamless integration with existing services.

- Transformer Sizing and Coordination:
- Size new transformers appropriately to handle increased loads.
 - Collaborate with EPCOR for the procurement and installation of switching cubicles, ensuring that the new transformers are properly integrated into the network.

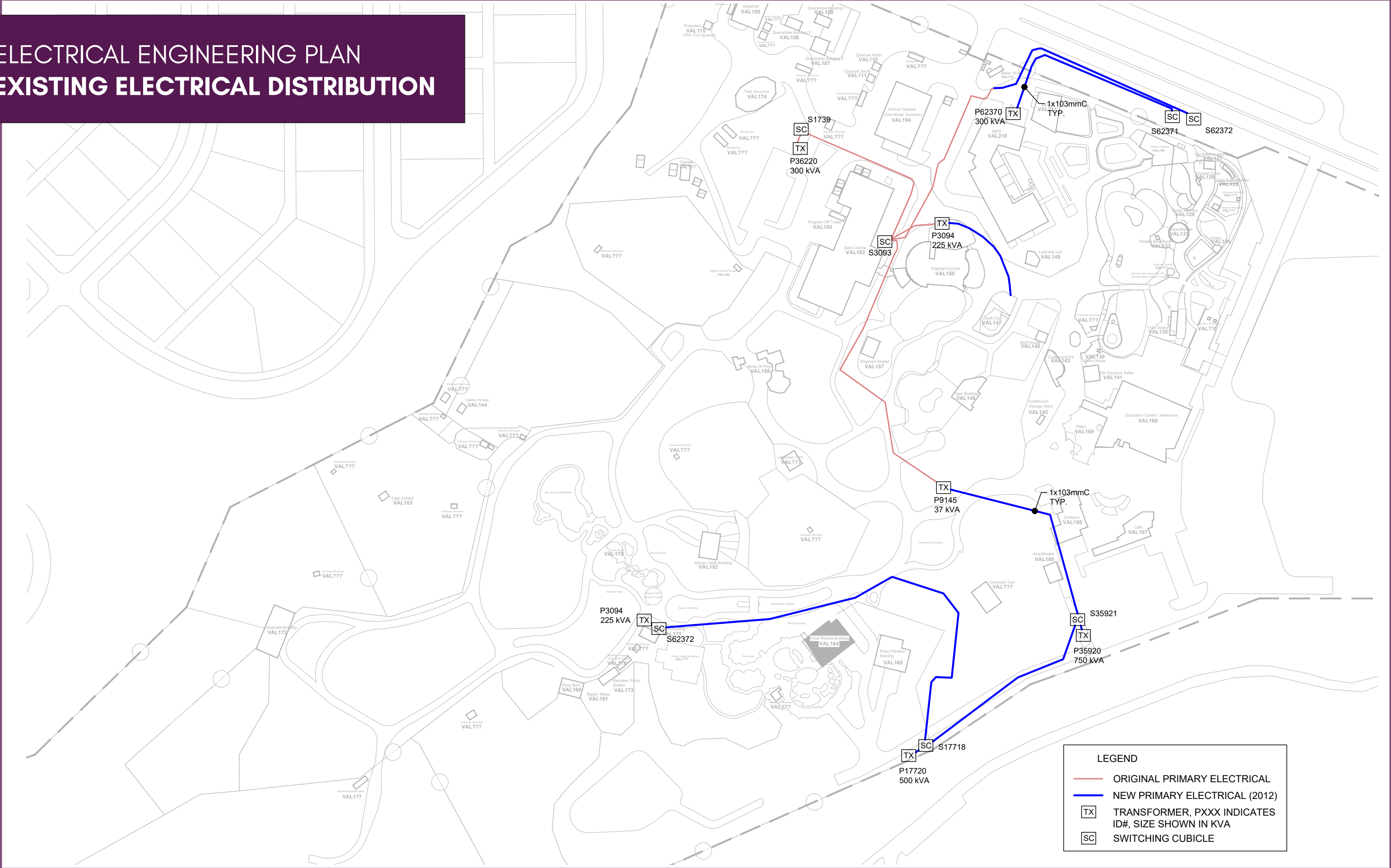
- Design of Secondary Feeders:
- Although secondary feeders are the responsibility of the building designers, coordination is necessary to ensure that the feeders are compatible with the expanded primary network.

- Landscape Coordination:
- Work closely with landscape architects to determine the exact placement of conduits, pull boxes, and other infrastructure components, ensuring that the expanded network integrates seamlessly into the site’s overall design.

- Solar Considerations
- The electrical assumptions exclude solar integration. Detailed investigations on solar integration—including excess production, and BESS—can be addressed during the detailed design phase for that area or as a separate project for the site. Additionally, the network must be designed with worst-case conditions in mind—assuming low or no solar output—to ensure that full power capacity from conventional sources is available. The solar structures shown in the concept renders are conceptual, and the degree of solar power generation can be further explored in the design phase.

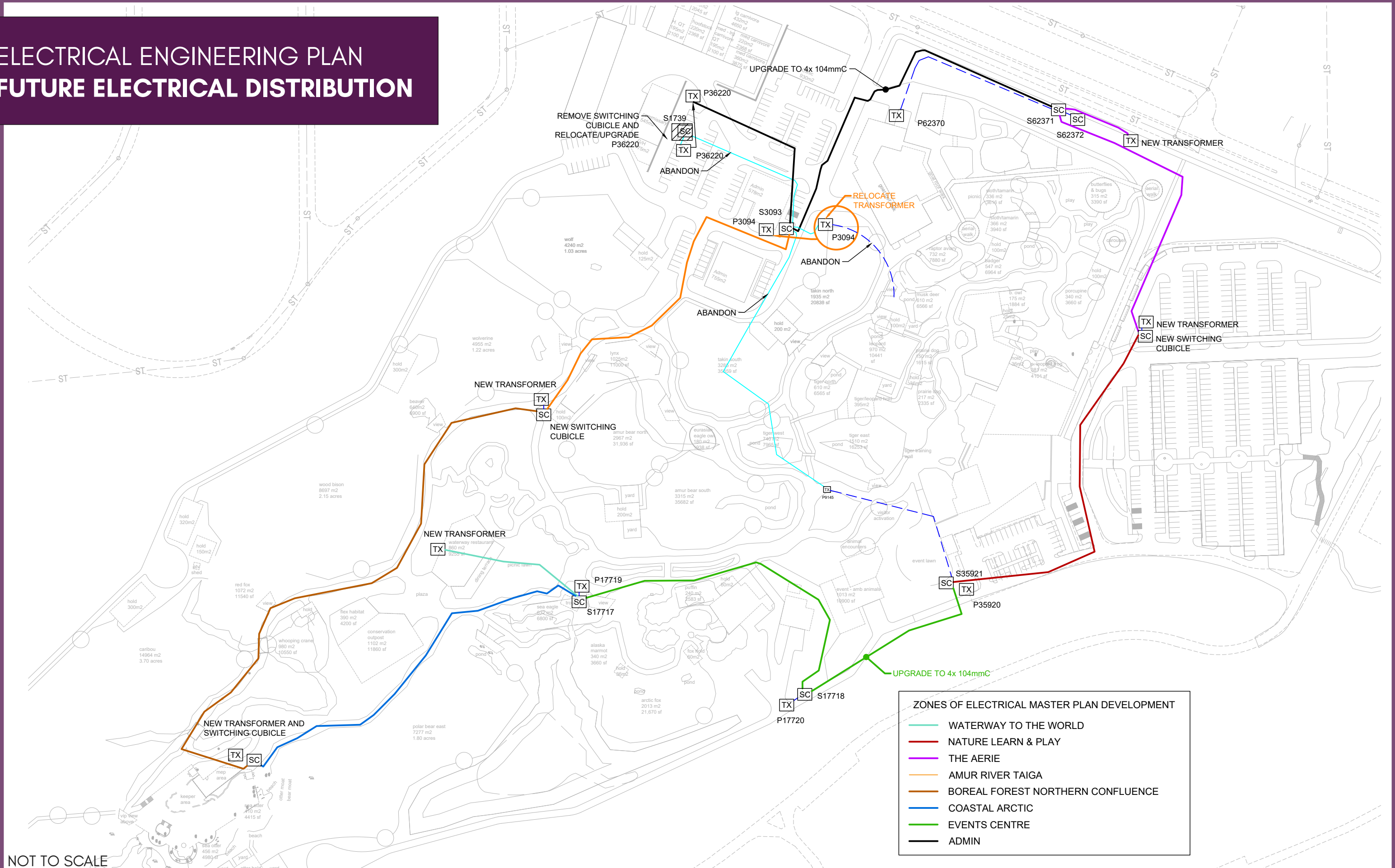
ELECTRICAL ENGINEERING PLAN

EXISTING ELECTRICAL DISTRIBUTION



ELECTRICAL ENGINEERING PLAN

FUTURE ELECTRICAL DISTRIBUTION



Master Plan Site Design Considerations

Excellence in animal wellbeing and the visitor experience is at the core of the EVZ design philosophy. This excellence is achieved through integrated and innovative animal habitat design that elevates the visitor experience through landscape immersion. The design approach provides a platform for compelling interpretation and education and facilitates efficient and meaningful site enhancement.



Landscape Immersion

Landscape immersion offers an extension of an animal's habitat into the public realm, transporting guests into the world of the animal. Extending the wild experience of the animal's home into the visitor experience fosters empathy for the animal by creating a mutual experience within a shared landscape, where if it were not for the barriers in place, people and animals would be in the same environment.

Habitats and surrounding public area landscapes should borrow expansive natural landscapes where possible to simulate forest, woodlands, grasslands, and riparian areas, providing the animals with long territorial views, complexity, and places to feel safe and protected. Each animal is part of its ecosystem and bioclimate and the goal is to be immersed in not just a habitat, but in the animal's life.

Habitat simulation entails presenting animals in the most natural way possible by including them in appropriate social groups in holistic ecosystems within their respective bioclimatic landscapes. This approach requires that textures, forms, landscape features, and colours within the habitat spaces draw from those of the animal's home environment. Careful selection of plant material is integral to the success of this approach in order create lasting habitats that can withstand the Edmonton climate while relating to the character of the animal's home environment. This is further discussed in the Landscape and Horticulture section on page 157.

Simulation of an animal's native habitat not only demonstrates the value and beauty of the world's dynamic wild spaces, but it also provides a context within which the animal can elicit their natural behaviour and provides a framework for fostering public understanding of animal behaviour, physical adaptation, and the historic relationships between animals and their ecosystems.



Architectural Expression

At the Edmonton Valley Zoo, conservation-focused, sustainable, and nature-inspired principles should integrate into the development of architectural designs as the Master Plan is implemented. The built environment focuses on the creation of environments that prioritize animal welfare while providing visitors with engaging and educational experiences. The shift to spaces that are in-tune with the natural environment displays the zoo's mission as a center for conservation and education.

While landscape immersion is a critical attribute to zoological design, consideration will be given to the influence that architectural design has in creating impactful habitat and visitor amenities. Viewing spaces should be designed as immersive environments with the goal to create meaningful connections between the animals and visitors, inspiring greater awareness and support for conservation efforts. This experience utilizes structures that are attractive, contribute to the theming and narrative, and demonstrate sustainable building practices. These will be enhanced by architectural buildings and structures that blend into the environment, rather than distract from it, ensuring that the focus remains on the animals.

The architecture of the Edmonton Valley Zoo will prioritize sustainable and wildlife-friendly practices as a cornerstone of the design, showcasing their commitment to environmental conservation. Strategies such as renewable materials, energy-efficient systems, green roofs and photovoltaics will play a key role in achieving these goals. The structures also must withstand decades of use and will be designed for longevity to not only reduce the environmental impacts, but also to reduce the need for frequent renovations, preventing disruptions to the animal habitats and prudent financial management.

The architectural expression of the buildings at the Edmonton Valley Zoo will be rooted in the principles of nature by blending with the surrounding landscapes. The aesthetic draws inspiration from nature, mimicking forms, textures and patterns to create a sense of harmony within the landscape. An important component of zoological architecture is understanding how to appropriately convey thematic intent, without cultural appropriation, inaccurate representation, or overpowering natural spaces with human-centred design. Each building will emphasize the interconnectedness of humans, animals and the environment.



Animal Wellbeing & Husbandry

The EVZ strives to provide the highest standards of care for animals, ensuring both physical and psychological wellbeing while supporting conservation, research, and educational goals. For the EVZ, animal welfare is a top priority. Beginning with thoughtful animal species selection based on climate, capacity, site considerations, conservation and research opportunities, and space available, and with the introduction of a new Master Plan, animal wellbeing is continually prioritized via expanded improved, and new infrastructure, care spaces, and habitats.

The Master Plan lays the groundwork for habitats and support facilities to be designed for safe and optimal conditions for animals and care staff, providing control, choice, and decision-making for every species. Animal spaces should be purpose-built to allow each species to display their natural behaviors and meet their core needs, while being adaptable for a variety of experiences and to accommodate enrichment. Habitats and support spaces should also be flexible enough that similar species can be housed there when needed when unforeseen circumstances present themselves or in the event of species obtainability challenges. Habitats should be immersive, spacious, and complex, and holding spaces should be designed with habitat features.

Indoor spaces should be designed for the health of animals and people, and include outdoor views from various levels, a variety of substrates, abundant natural light and ventilation, and support the best care for animals. With a focus on animal care and wellbeing supported by the physical improvements, animal care staff may concentrate on exceeding basic care needs and routine maintenance by anticipating movements, social interactions, and physical and psychological needs. Efficient operations ensures that more time will be available for enrichment and training opportunities.



Visitor Experience

The EVZ focuses on delivering a memorable and engaging guest experience that wows and connects people with animals and the natural world. The visitor experience at the EVZ will be grounded in landscape immersion and habitat simulation, as humans may become closer to animals by experiencing the animal's world alongside them. This shared experience creates a framework within which to understand, respect, and prioritize the innate relationship between animals and their natural, wild habitats, reinforcing the critical understanding that to preserve wildlife, we must preserve wild spaces. The organization and presentation shared in the Master Plan proposes new and improved animal and visitor spaces that will emphasize conservation, promote a sense of discovery and excitement, and ignite inspiration to take conservation action.

The Master Plan introduces a significant number of parallel play opportunities alongside other engagement tactics. Parallel play is a distinct form of play element design that encourages the user to mirror play behaviours, such as those exhibited by animals as they explore their habitats and utilize animal furniture and enrichment objects. Parallel play helps the visitor shift their perspective from a human-centric one, instead seeing the world through an animal's eyes. Perspective-taking is a powerful tool in building empathy that helps us understand their daily lives and challenges, deepening our sense of awe. As these elements are designed, thought should be given to how to encourage the animal-like behaviours in children, as opposed to generalized nature play, which serves a different, more open-ended purpose.

Visitor Experience should be placed on an equal pedestal to other considerations, and should reflect the EVZ commitment to accessible and inclusive design. Previously explored on page 118, these practices ensure that all visitors and staff feel welcome and sense of belonging at the EVZ.



Parking

The parking design strategy for the EVZ is based on understanding current challenges and organizational requirements and reflects the potential growth in visitation and staffing over the next fifteen years. While supporting EVZ daily visitor operations, the main parking lot also functions to manage storm water for a significant portion of the Zoo site (refer to Page 131 for a more detailed review of stormwater management). The parking lot uses a mixed approach for managing water, with LID solutions (bioswales, soil cells), underground storage, and a constructed wetland. The LID facilities support vegetation growth and allow canopy trees to be planted throughout the parking area to provide summer shade.

The design as presented balances parking supply with stormwater, landscape and parking needs.

PUBLIC PARKING

Currently, the paved Buena Vista Road entrance transitions into a broad gravel lot with eight parking rows delineated by wheelstops amid adventitious plants. The main Zoo entry’s rammed-earth wall and sculpture are visible from the entire parking lot as the parking lot is entirely bare of trees. At present there are no parking fees imposed on visitors.

The Master Plan goals for the parking lot are:

- Create a welcoming, attractive entrance to the Zoo;
- Enhance the visitor experience from the moment visitors arrive;
- Provide a cleaner, smoother surface with clearly demarked parking spaces and pedestrian paths;
- Offer enough stalls to meet the attendance demand most days of the year and support the future growth in attendance;
- Help to manage stormwater flow and storage through LID facilities and constructed wetlands and;
- Establish a sense of place, helping visitors understand and appreciate the Zoo’s location in the North Saskatchewan River Valley.

The proposed parking area (sees next page) will be paved, reconfigured, and striped to clearly delineate parking stalls, drive aisles, and pedestrian walkways to the main entry plaza. The pedestrian spine aligned with the Zoo’s entry gate and sculpture will be slightly raised above the adjacent parking area, with the dual purpose of clearly identifying the preferred pedestrian route and of slowing traffic. The number of accessible stalls is increased to exceed minimum standards to reflect the Zoo audience needs. This includes identifying the first row of parking as priority for caregivers with babies, seniors, and others with mobility needs that may require better access.

The reconfigured parking area uses different stall sizes to maximize parking efficiency and includes approximately 287 regular stalls for full sized vehicles, with specialty stalls designed for 51 compact vehicles (7 stalls will have EV chargers), 10 wheelchair accessible stalls with transfer aisles, 10 full sized buses and a specified area for buses, oversized vehicles, and vehicles with trailers. The specialty parking stalls will require identification signage.



DETAILED SKETCH
PARKING LOT, INTERPRETIVE WETLAND BOARDWALK, ENTRY PLAZA

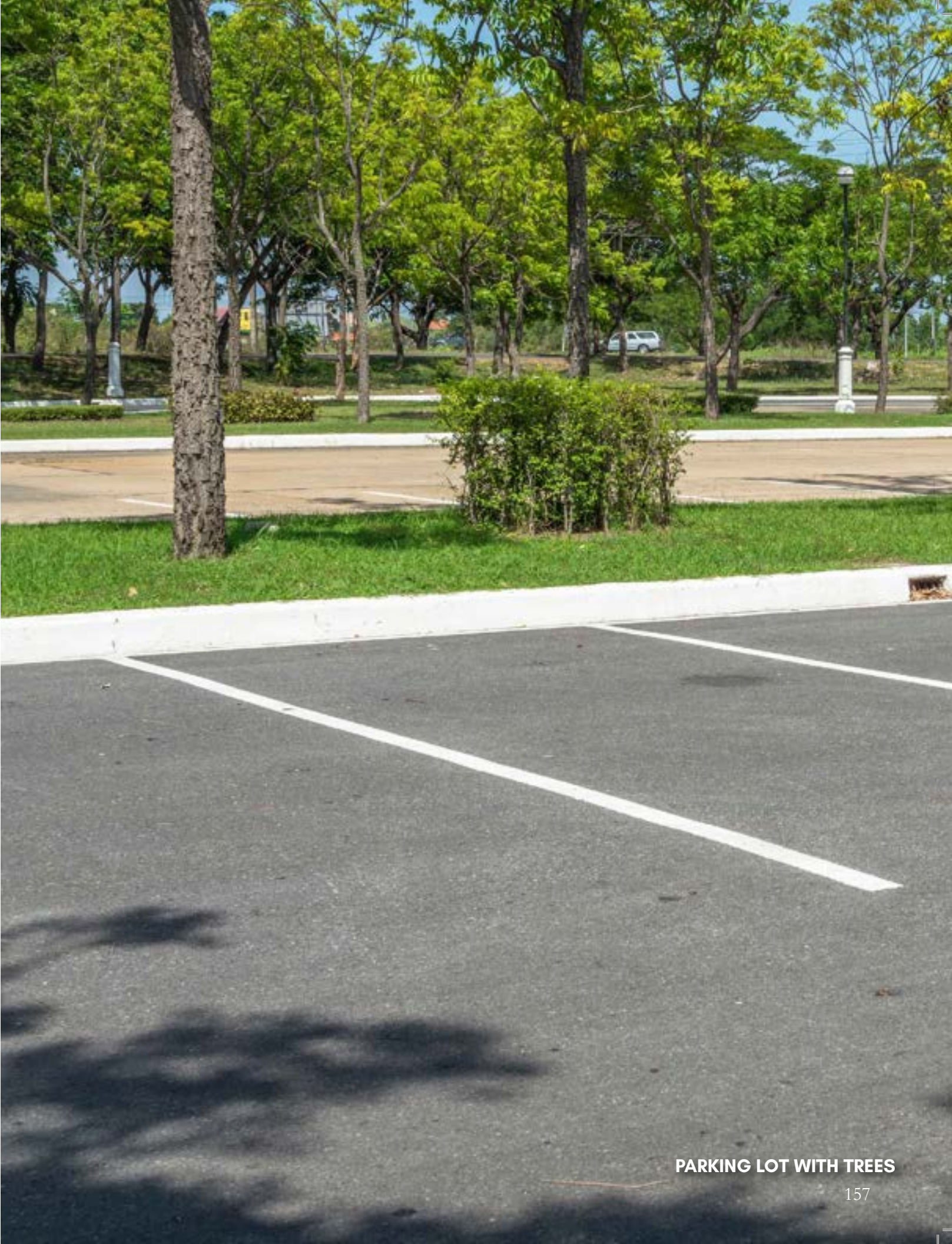
PARKING CONFIGURATION

This configuration will accommodate daily attendance of approximately 2,350 persons, currently occurring ten days per year. By 2040, with full implementation of the Master Plan, attendance would exceed that amount on an estimated 70 days per year. Additional parking management actions and supply will be assessed as Master Plan is implemented.

The following options to manage and accommodate parking demand have been considered:

- Use the lawn across Buena Vista Road in Buena Vista Park for overflow vehicles. It is estimated that up to 300 vehicles could be accommodated within a 500 meter walk to the main gate. This extra supply would be needed primarily on summer weekends including some Fridays and occasional holidays. A driveway apron to the lawn already exists and the roundabout can conveniently allow access with advance signing when the main lot is full. Still, even with this extra supply, not all demand will be met.
- Encouraging earlier arrivals to spread the peaking tendency. A goal would be to achieve a peak accumulation of 55% of daily visitors at one time versus the current 65%. This could be achieved by implementing timed-ticketing and/or variable pricing.

- Implementing parking fees for Zoo visitors. Variable fees could encourage visitors to choose different times of the day or days of week to visit the Zoo. Increasingly popular on-line payment applications simplify collection and enforcement of parking fees. Edmonton’s EPark program and HotSpot app may be one option for implementing an on-line payment system. This could also be managed by a partner, such as the Valley Zoo Development Society to generate revenue for the zoo.
- Considering longer seasonal hours for visitors to assist with spreading out the peak visitor volume. This could include early member access or extended evening hours.
- Continue to explore public transit expansion with the City of Edmonton, particularly on a seasonal basis. Currently, the only option is an on-demand system.



PARKING LOT WITH TREES

STAFF AND MAINTENANCE PARKING

The Master Plan anticipates an increase in staffing over the 15-year implementation which will result in the need for additional staff parking as well as dedicated parking for several Zoo fleet vehicles and maintenance equipment.

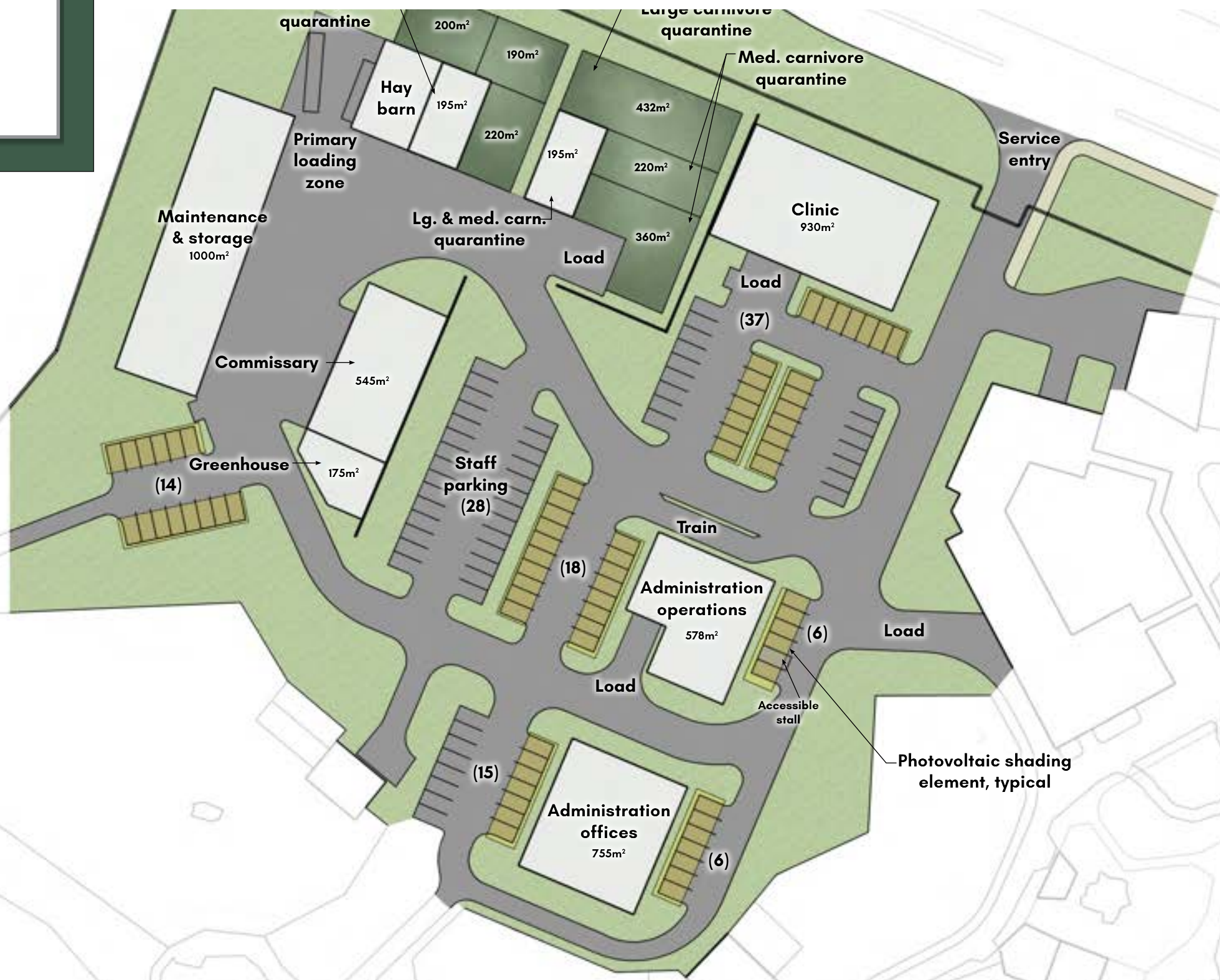
The layout (see next page) reflects an increase in the administration/back-of-house parking area to 129 stalls. Ten of those spaces are dedicated to fleet vehicle outdoor parking and the remaining 14 stalls will be used by staff and contractors. There are 19 Zoo-owned vehicles/equipment to be housed on the heated ground floor of the new maintenance building including the maintenance ATVs, skid steers, and snow removal equipment. The heated building will support snow removal equipment readiness for snow clearance operations, as well as protect the equipment from freezing and allow space for vehicle maintenance to occur year-round.

Potential Staff Growth	
Existing Peak Summer Staff	124
Potential Growth over 15 years	15%
Added Staff	19
Potential Future Staff Parking Demand	
Assume Percent Present at One Time	85%
Assume Percent Drive	95%
Assume Average Vehicle Occupancy	1.1%
Total Staff Vehicle Parking*	105
*Before any potential transit, vanpool/carpool increases	

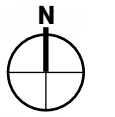
Legend

Site Infrastructure

- Operational Buildings
- Service/Parking
- Public Pathway
- Landscaped Area



**DETAILED SKETCH
ADMINISTRATION**



NOT TO SCALE

Lighting

Site lighting is an important element of the Master Plan and varied needs were considered around visitor experience, safety, animal wellbeing, wildlife-friendly design, energy efficiency and overall ambiance of the space. The lighting strategy also considers the dark sky initiatives that look to benefit the surrounding areas of the Edmonton River Valley.

LIGHTING

As phases of the Master Plan are implemented, projects should consider the following key strategies:

- 1. Animal-Centric Design:** Prioritize lighting systems that ensure no impact to animals. Use warm, low-intensity lighting with a natural color spectrum to replicate their native environments and avoid disrupting circadian rhythms. Incorporate shielded fixtures to reduce glare and light spillage into habitats.
- 2. Visitor Pathways and Wayfinding:** Use a hierarchy of lighting to guide visitors safely and intuitively through the Zoo. Illuminate primary pathways with consistent, uniform lighting, while secondary pathways and gathering spaces can incorporate decorative or thematic lighting to enhance the immersive experience.
- 3. Thematic Lighting for Immersive Experiences:** Highlight exhibits with creative, storytelling-driven lighting. Dynamic lighting effects, such as adjustable color temperatures or projections, can evoke a sense of place while respecting animal sensitivities.
- 4. Sustainability and Energy Efficiency:** Leverage LED technology, solar-powered fixtures, and smart lighting controls to minimize energy consumption and reduce the zoo’s carbon footprint. Implement motion sensors and dimmable systems in low-traffic areas to further enhance efficiency.
- 5. Nighttime Programming and Events:** Create distinct lighting zones for nighttime experiences such as Zoo Brew or Zoominescence, ensuring that animal wellbeing needs are prioritized when designing after hours experience. Incorporate soft, ambient lighting to create an inviting atmosphere while maintaining safety.
- 6. Dark-Sky Compliance:** Minimize light pollution by adhering to dark-sky principles. Use downward-facing fixtures, shields, and controlled light intensity to preserve natural nightscapes, benefiting both animals and local ecosystems. Utilize timers to reduce light pollution when the Zoo is closed.
- 7. Safety and Security:** Strategically place lighting to ensure visibility and safety in high-traffic areas, parking lots, and entrances while avoiding over-illumination. Integrate security-focused lighting with discrete, aesthetically pleasing fixtures to maintain the zoo’s natural feel.

By integrating these strategies into the Master Plan, the Zoo can provide an engaging, sustainable, and animal-friendly environment while addressing site operations and safety.

Safety and Security

The Edmonton Valley Zoo ensures the safety and wellbeing of people and animals at all times. The Master Plan reflects that commitment, integrating safety and security infrastructure and practices, which should be implemented as projects move into design.

“The AZA accreditation standards read – ‘One of the three core principles upon which AZA-accredited zoos and aquariums operate is safety. Facilities must be properly maintained, infrastructure sound, proper practices in place, staff aware and trained, and a culture of safety inherent throughout the institution. All reasonable concerns regarding the welfare of individual animals or groups, visitors, and staff must be thoroughly assessed and corrected.’ Regular inspections, emergency drills, animal welfare assessments, and more are all a part of AZA’s accreditation standards, designed to keep animals and visitors safe.”

– AZA Connect Magazine

SAFETY ACCREDITATION REQUIREMENTS

Human and animal safety is a key component of CAZA and AZA accreditation, with requirements to keep people safe from animals, animals safe from guests, and animals safe from each other. In addition to design requirements for animal facilities including containment and barriers, management and holding operations, the accreditation standards include protocol and standard operating procedures to ensure all practices related to animals in human care are conducted in a safe manner. The Master Plan reflects CAZA and AZA accreditation requirements for animal containment, people barriers, habitat and holding design, and animal management.

CPTED

Crime Prevention Through Environmental Design (CPTED) is a multidisciplinary approach to deterring anti-social or criminal behavior through environmental design. In the context of zoos, CPTED principles can be applied not only to enhance security but also to improve the visitor experience by fostering a sense of safety, comfort, and engagement.

CPTED PRINCIPLES AND THEIR APPLICATION IN ZOOS:

1. Natural Surveillance

Objective: Increase visibility to deter potential criminal behaviour and create a welcoming atmosphere.

Application:

- Design open pathways and strategic viewpoints for visitors to enjoy unobstructed views of habitats and other public areas.
- Incorporate large glass viewing panels and raised platforms at exhibits to provide clear sightlines while ensuring safe distances from animals.
- Install appropriate lighting in parking lots, entrances, and exhibit areas to maintain visibility during evening hours.

2. Territorial Reinforcement

Objective: Foster a sense of ownership among staff and visitors, discouraging unwelcome activities.

Application:

- Use landscaping, signage, and distinct architectural styles to delineate public areas, staff-only zones, and restricted spaces.
- Encourage visitor interaction with well-marked wayfinding, themed zones, and areas designed for interactive experiences.
- Display prominent signage with positive messaging that guides visitor behaviour and highlights conservation efforts.

3. Access Control

Objective: Regulate the flow of people to minimize unauthorized access and improve safety.

Application:

- Install tickets entrances with clear entry and exit points to manage crowd control.
- Use natural barriers like water features, rocks, or dense vegetation to define pathways and limit access to animal enclosures.
- Incorporate turnstiles or gates in areas where high security is required, such as animal exhibits or restricted zones.

4. Maintenance and Management

Objective: Promote a well-maintained environment to signal active management and discourage vandalism or neglect.

Application:

- Regularly maintain landscaping, pathways, and facilities to ensure cleanliness and safety.
- Promptly repair broken lights, damaged fences, or graffiti to maintain a positive impression.
- Employ uniformed staff and visible security personnel who contribute to a secure and approachable environment.

5. Activity Support

Objective: Encourage positive activities in public spaces to enhance community engagement.

Application:

- Design opportunities for parallel play adjacent to exhibits and education workshop to attract visitors and keep spaces active.
- Host seasonal events, tours, and conservation talks to increase foot traffic in specific areas, making them less susceptible to misuse.

BENEFITS OF CPTED IN ZOO DESIGN

- Enhanced Visitor Safety:** Well-lit, clearly designed spaces reduce opportunities for crime and accidents.
- Improved Experience:** Visitors feel comfortable and secure, allowing them to fully enjoy exhibits and amenities.
- Support for Conservation Goals:** Effective use of signage and interactive features helps zoos communicate their conservation message.
- Operational Efficiency:** Proper access control and maintenance minimize resource wastage and improve staff productivity.

By integrating CPTED principles into zoo design, institutions can create environments that are safe, engaging, and supportive of their mission, vision, and strategic priorities. This approach not only deters crime but also enriches the overall visitor experience, fostering long-term community support for the zoo’s initiatives.



CAMERAS AND MONITORING

As Master Plan phases and projects are implemented, all requirements to include CCTV monitoring should be included, in both people spaces and back-of-house areas. In addition to supporting site safety, cameras in animal spaces can help monitoring wellbeing, particularly at night. Some animals are more active at alternative times of the day, and monitoring helps ensure wellbeing needs are met 24/7/365. As projects are implemented, enhancement of the camera network should be incorporated.

INDOOR SPACES

The Master Plan addresses the current deficiency in the quantity, layout, and capacity of indoor, securable spaces. In the event a need arises for visitors to take immediate shelter, these spaces need to be easily accessible without requiring significant travel distance across the site or access through staff-only, locked spaces (such as operational/ animal buildings). The diagram on the next page indicates large and small buildings that are publicly accessible that could be used for emergency shelter.

The Master Plan adds the following buildings to help address this need:

Outer Zoo

- Arctic Gallery
- Conservation Outpost
- Waterways Multi-Use Dining/Program Venue
- Event Centre

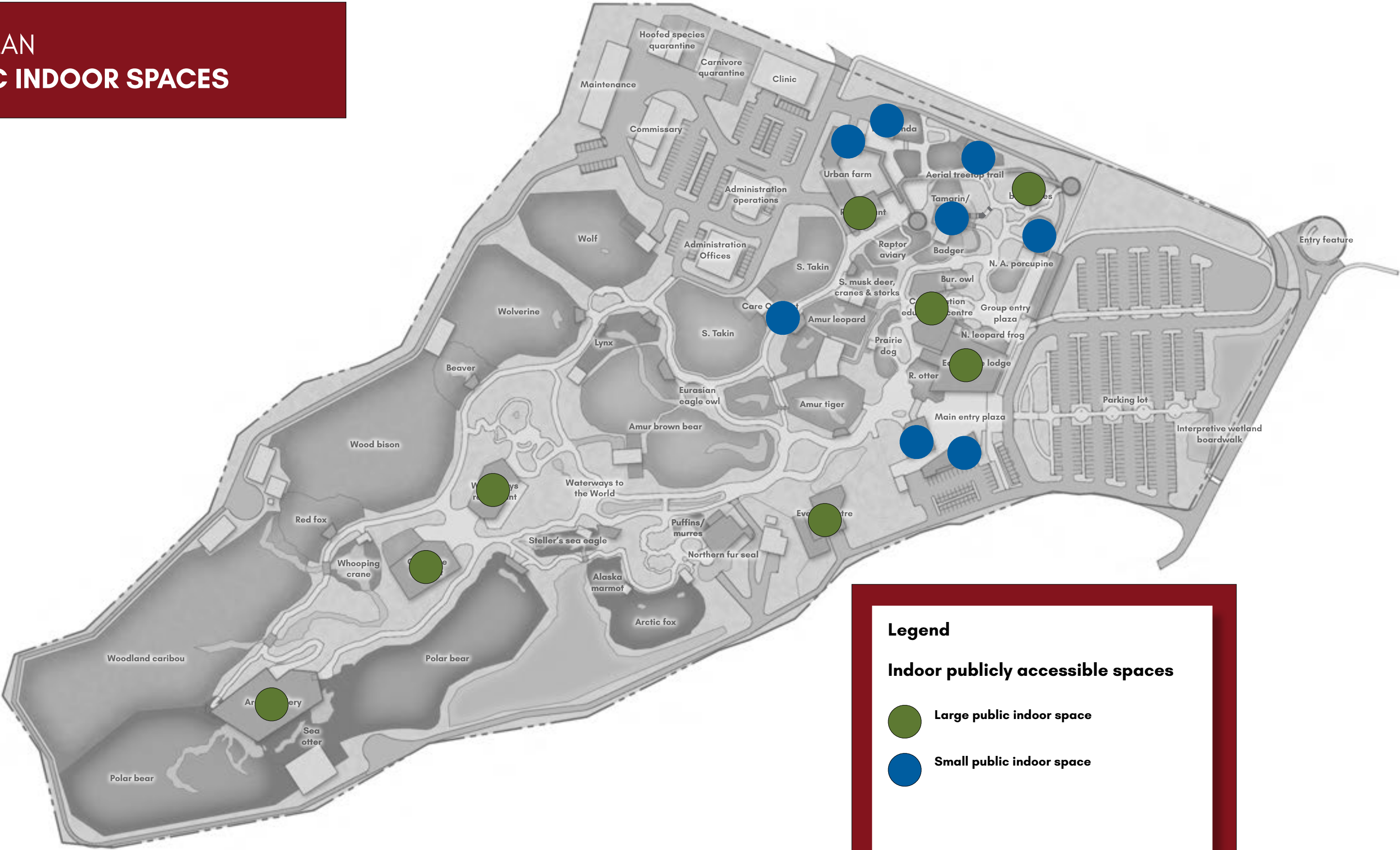
Inner Zoo

- Conservation Education Centre
- Bugs & Butterflies Pavilion
- Tamarin & Sloth Indoor Public Viewing
- Connect Outpost with Carousel
- Care Outpost



RED CROWNED CRANE

SITE PLAN
PUBLIC INDOOR SPACES



NOT TO SCALE

Landscape and Horticulture

While designing for immersive landscapes in a zoological setting is important, for that approach to be successful, plantings must be able to establish and thrive in the local climate. Plants must also be safe for animals, as many will ingest, rub against, or rest on planted material.



LANDSCAPE STRATEGY

The landscape of the Edmonton Valley’s Zoo proposed ecoregions will be defined using bioclimatic references with respect to plantings, geology and landform, as well as to hydrological, soils and climate references. Bioclimatic zones are key to the immersive design process that puts animals and guests together in the same visually tactile environment. The Master Plan proposes the following distinct bioclimates that are distinct from the local Central Parkland Natural Subregion: Asian Boreal Forest of the Amur River; the Canadian Boreal Forest, and the circumpolar Coastal Arctic. The landscape focus on non-bioclimatic areas, such as the parking area, events lawn, back of house areas, constructed wetlands, etc. is to strengthen the Zoo’s ties and natural connections to the greater North Saskatchewan River Valley ecosystem within the Central Parkland.

ANIMAL CONSIDERATIONS

Landscape material selection should be balanced with anticipated resource requirements, including irrigation and maintenance needs, as well as potential browsing and animal toxicity within proposed animal habitats. All plant species proposed for the Zoo should be reviewed by the animal care team for toxicity, especially before planting in habitats. Seed dispersal may also impact what may be planted and where.

Consideration also needs to be made for protecting new planting in habitats from animals. Each species will have specific requirements, and different strategies can be deployed to help plants establish including tree protection fencing, hot wire/grass, ground substrates, plant species choice (non-edible). Landscape designs should also reflect animal requirements for containment, shade and how the animal will interact with the planting. For example, there may be desire for some species, such as red pandas, to climb trees, but that can pose a containment risk if not planted or pruned appropriately.

Areas within the Zoo grounds can be identified and planted now to provide fresh cut browse to have ready for future animal habitats. Browse can also be harvested for winter storage, either intentionally or opportunistically such as during a storm event.

PLANTING STRATEGIES IN EDMONTON

With a northern, dry climate, Edmonton can be a tricky place for plants to establish. Plant species should be chosen that are suited to the Edmonton climate and soil conditions. A tactic frequently used in challenging climates is the use of plant species that resemble those from a different landscape, but that will grow in the chosen climate. These ‘mimics’ help create an experience that resembles the designed ecosystem, while thriving in the local environment. Site context should also inform plant selection based on natural hydrologic patterns, wind, snow load and storage.



LANDSCAPE CONSIDERATIONS FOR THE EVZ MASTER PLAN

1. NATIVE PLANTING IN ZOO DESIGN:

Use Local Flora

- Incorporate native plants like Saskatoon berries, wild roses, trembling aspen, prairie grasses, among others. These plants are adapted to the local climate, require less maintenance, and support local wildlife.

Habitat-Specific Zones:

- Wherever possible, use native vegetation to create immersive, ecologically accurate enclosures for animals local to Alberta. For example, plant trembling aspen, lodgepole pine, and prairie grasses in the Northern Boreal and Prairie zones.
- Incorporate riparian vegetation like cattails and bulrushes near water features for wetland species.

Biodiversity Corridors:

- Use native shrubs and trees to form green corridors “connecting” animal enclosures with public spaces, fostering pollinators and bird populations. Ensure continuity in the planting from habitat to people space to create the immersive feeling.
- Include diverse layers (canopy, understory, ground cover) to mimic natural habitats.

Themed Gardens:

- Create educational gardens with themed intent, such as featuring edible and medicinal native plants significant to Indigenous cultures shared through appropriate consultation and engagement (eg, Saskatoon berries, wild mint, and fireweed), or pollinator-friendly spaces with wildflowers such as goldenrod, yarrow, and bee balm, to attract pollinators like bees, butterflies, and birds.

Seasonal Appeal:

- Incorporate native plants that bloom in different seasons to maintain visual interest year-round and attract native pollinators like bees and butterflies.
- Select native plants that offer year-round visual interest, such as flowering plants in summer, berries in fall, and textured grasses in winter.

2. PRACTICAL CONSIDERATIONS:

Cold Climate Adaptations:

- Ensure plants and LID structures can endure Edmonton’s winter. Use materials and vegetation resilient to freeze-thaw cycles and heavy snow loads.

Wildlife-Friendly Practices:

- Select plants that provide habitat and food for Alberta’s native fauna, such as birds, small mammals, and pollinators.

Fire-Smart Landscaping:

- Use fire-resistant native plants near buildings and enclosures to reduce fire risks in dry summers.

3. COMMUNITY AND EDUCATIONAL

Interpretive Signage:

- Install educational signs that explain the benefits of native plants and LID features.

Outdoor Classrooms:

- Create spaces where visitors can learn about local ecosystems and sustainable practices.

Partnerships with Indigenous Groups:

- Collaborate with local Indigenous communities to incorporate traditional ecological knowledge and culturally significant plants into the design.



URBAN FORESTRY REQUIREMENTS

For any construction activity involving City of Edmonton-owned and maintained trees or tree stands (asset trees), must comply with Urban Forestry requirements. Where possible, the Master Plan avoids high-value trees that would need to be removed for the project, however this is not possible in every instance. Projects should carry a tree-removal allowance to ensure the associated costs are captured in the budget.

Urban Forestry Goals

- Maintain as many trees as possible when implementing projects
- Increase number of trees onsite, contributing to the COE 2 Million Trees Initiative

Projects must identify all asset trees located within the project boundary and determine which trees may be impacted by construction activities. This includes trees near active construction zones as well as those that may need to be removed to accommodate proposed designs.

Once the inventory of trees within the area affected by the project is complete, the project team must contact the City of Edmonton Urban Forestry (Urban Forestry) to conduct a comprehensive assessment of the trees. This assessment will evaluate their condition and determine their asset value. Additionally, the project team must submit a tree protection and preservation plan that complies with municipal standards.

After Urban Forestry completes the tree assessment and assigns asset values, the project team will coordinate with Urban Forestry to arrange tree removals. The associated costs, including the removal team’s services and the asset value of the removed trees, will be charged to the project.



Climate Resiliency and Sustainability

Implementing and showcasing resilient green practices for climate mitigation, adaptation, and biodiversity benefits is identified as the fourth Strategic Objective of EVZ’s Conservation Focus Area. Within this objective, the EVZ has identified four priorities:

1. Implement nature-based solutions on site
2. Make the shift to more green energy
3. Further reduce carbon emissions by implementing energy efficiency initiatives
4. Work towards becoming a sustainable and zero-waste facility

The City of Edmonton also (COE) prioritizes climate resilience, nature-based solutions, and environmental sustainability through the City Plan and is transitioning to a low-carbon future with a focus on generating and expanding renewable energy and reducing and mitigating climate change. COE has a climate resilient policy for sustainable design, including goals for buildings to be designed and constructed to meet Leadership in Energy and Environmental Design (LEED) Silver Certification, in addition to other sustainability standards.

BUILDING ON A STRONG FOUNDATION

The Zoo has undertaken significant efforts to document opportunities to enhance sustainability, including the *2016 Sustainability Report* and the *2024 Report: Opportunities to Integrate Climate Change Adaptation Strategies to Support Biodiversity Conservation* at the EVZ. These detailed reports align with recommendations from the Association of Zoos and Aquariums (AZA) Green Guides and provide a strong foundation for the future of sustainability practices at the EVZ. The Master Plan also aligns with the recommendations of the Climate Resilient Edmonton: Adaptation Strategy and Action Plan, and other City of Edmonton Sustainability Strategies, as discussed earlier in this document.

CLIMATE RESILIENCE PLANNING

The effects of climate change on biodiversity are being felt in every region on Earth, but Alberta and the Arctic are warming faster than elsewhere and Alberta is drying faster than anywhere else in Canada. Temperature extremes and smoky skies from wildfires are becoming more common and plant hardiness zones are changing. Animal species and plants that thrive in Edmonton now, may not in the future. Animal seasonal migrations and breeding events are being disrupted, habitat ranges are altering, and parasites and diseases are increasing.

The 2025 Master Plan and the EVZ are addressing this in some of the following ways:

- Participating in the global movement, IUCN-Reverse the Red, to ignite optimism and collaborative action to guarantee the survival of all species
- Considering the evolving climate in the Animal Resident Plan, and providing for flexible habitats to capture opportunities and respond to unforeseen circumstances
- Preserving existing trees and taking plant hardiness zones into account while selecting new plant species, including how this might change in the future
- Strategically selecting species that are ideal climate ambassadors, such as Polar bears, or lesser-known organisms like Arctic invertebrates
- Engage visitors in holistic, ecosystem stories focused on climate change
- Provide new indoor education spaces and improve air quality of existing indoor space to accommodate educational opportunities when wildfire smoke is present in unsafe levels
- Design for wildfire resistance

SUSTAINABILITY

The Zoo is anchored within the North Saskatchewan River Valley, adjacent to Sir Wilfrid Laurier Park and Buena Vista Park. This riverine forested corridor allows the Zoo to demonstrate how its sustainable actions can impact the Valley as well as to the greater Parkland region. The Zoo’s setting reinforces the significance of ecological health, the importance of biodiversity, and how a conservation-based institution responds to climate change.

Sharing the Zoo’s sustainability and conservation philosophy requires the engagement of staff and visitors in on-site education opportunities and programs. Utilizing Carbon Footprint Reduction tactics conveys to visitors how the Zoo reduces greenhouse gases in day-to-day operations through the use of electric vehicles and solar recharging stations; increasing building efficiency to reduce heating/cooling needs; and use of LED lighting to reduce electrical consumption. Visitor services can pursue more sustainable/compostable packaging and supplies for more responsible sourcing to reduce the impact on the City’s waste streams, in alignment with the City waste management bylaw.

Sustainability education should focus on actions that are accessible and targeted for the visitor audience by addressing barriers such as cost, access, age, decision-making power, and practicality. The AZA has extensive resources to support developing conservation and sustainability education frameworks, including the 2022 document “*From caring to action a unified framework for audience conservation engagement.*” These frameworks help distill complex practices into tangible tools for educators and interpreters delivering programs to engage with visitor audiences.

INFRASTRUCTURE AND OPERATIONS

The Master Plan approach to sustainability aligns with the COE guidelines, compliance with COE bylaws, policies and plans, and industry best practices. Wildlife-friendly design principles such as Dark Skies Initiative, green roofs, biomimetic design and bird-friendly design should be explored during each project’s design.

Sustainable design practices for landscape, architecture and engineering are integrated into the Master Plan. The Zoo’s new facilities and animal habitats will focus efforts to introduce nature-based and technology solutions to reduce their carbon footprint and will be required to meet LEED Silver Certification minimum where feasible. There is interest to explore the Living Building Challenge as well. The Zoo’s operations share a similar goal particularly in the areas of water conservation, use of electric vehicles for grounds maintenance, and recycling/composting as part the effort to divert materials from the waste stream.

New animal habitats, animal holding buildings, administrative and visitor buildings shall be designed to reduce energy demand (with accompanying cost savings). This will also occur in remodeled buildings to be renewed

or remodeled. The use of alternative and renewable energy systems, such as highly efficient building envelopes, smart energy control systems, and daylighting schemes will form the basis of ‘best practice’ to improve efficiencies and increase the supply of energy by low carbon means.

Passive, or low tech, design strategies suitable for Alberta should be given priority in the design and renovation of new and existing facilities. Renovation or adaptive reuse of existing facilities reduces the building material inputs and carbon emissions compared to new building construction. New buildings should be integrated into the landscape where possible following low impact design principles to protect site ecology and designed to properly manage snow, rain, and stormwater.

New habitats and buildings will be designed to decrease water demand and result in facilities that conserve and reuse water. Sound water conservation strategies include filtering, recirculating and reusing water such as animal system water and greywater, harvesting rainwater for landscape irrigation, and utilizing low flow plumbing fixtures. These actions will further reduce stress on the sewer system.

STORMWATER

By implementing sustainable and low impact drainage solutions, the development of the Edmonton Valley Zoo will be better equipped to combat climate change. Climate and flood resilience can be improved through the implementation of low impact drainage solutions and green infrastructure which will reduce the peak flow of stormwater and delay when the peak flow occurs. As storm events become more unpredictable, reducing and delaying the peak flow becomes an important consideration when assessing the risk to people, animals, and infrastructure.

Investigation into the use of low impact development (LID) technologies both in the parking lot and throughout the basin is an opportunity to employ more sustainable land use. This could provide required stormwater storage while allowing the Zoo to showcase its desire to be a leader in conservation and environmentalism. Funding opportunities for such infrastructure may exist, and a partnership potential with utility providers should be further investigated.

OPPORTUNITIES FOR CITY UTILITY CONSERVATION

Reducing water use while increasing efficiencies in the water infrastructure

- Replace dump and fill systems and install recirculating filtration systems which will include sand filtration and UV disinfection, lowering overall water usage and impacts on the Zoo’s sewer system

Energy Use Reduction

- Use of LED lighting technology.
- Photovoltaics in the staff and visitor parking areas via partnerships with the local utility.
- Transition energy portfolio to include more solar, alternative or renewable energy sources.

SUSTAINABLE BUILDING DESIGN AND PRACTICES: CERTIFICATION

Pursue environmental certifications

- LEED, Living Building Challenge, or other appropriate certification systems.

Facility Operations

Facilities and Horticultural Maintenance addresses all areas of the EVZ site, including equipment, buildings, pathways/roads, and exhibits. The site services team ensures the Zoo is proactively maintained, safe, and efficient for business needs as well as meeting standards for safe operation. The team supports all departments of the Zoo with respect to repairs and preventative maintenance.



GOELDI'S MONKEY

FLEET VEHICLES

The Zoo maintains a fleet of maintenance and staff vehicles for use in the various operations. There is currently no centralized space for the fleet, nor the ability to keep snow removal equipment warm enough for immediate use. Additionally, site services staff currently use a temporary, unheated construction trailer for meeting space. The Master Plan proposes taking care of all service staff with a new two-story Maintenance building that houses the fleet vehicles on the ground floor in a winter-heated space that also allows for fleet repairs and storage. The second floor is climate-controlled and serves as the maintenance offices and meeting room, with a dedicated locker/shower room. As the EVZ procures fleet vehicles and equipment, consideration should be made for electric options where feasible.

HORTICULTURE

The Horticultural team, with support from other City partners and departments tends to the permanent and seasonal plantings on the zoo grounds as well as the greenhouse. Plants are maintained for public safety and comfort and animal browse is cut opportunistically or as scheduled.

SERVICE ROADS

The Master Plan addresses a need to separate public pathways from service circulation, creating a new perimeter service road through a combination of paved roadways and an ATV track. (see Site Circulation plan shown previously on page 106). The service road allows vehicles up to the size of a fire truck to reach the back-of-house areas in the Coastal Arctic and Boreal Northern Confluence Zones, with vehicle turnarounds. The ATV track connects the two service paths at the deep west end of the zoo, addressing the need to monitor the perimeter and animal habitat fences while navigating the grading constraints of the site.

Some servicing will still need to occur on the public pathways, with central guest amenities and habitats only accessible via these paths. It is recommended that small maintenance vehicle pullouts be strategically placed to allow for parking off the visitor paths. Where possible, servicing and deliveries should occur before or after hours. If vehicles must access the public paths during the day, they should be accompanied by a walking flagger to direct pedestrian traffic as is the Zoo’s current practice.

Within the maintenance area, the Master Plan straightens the service road from the Buena Vista Road entrance to facilitate movement of larger trucks, including the hay wagon. It creates a clockwise loop for larger vehicles needing access to the new Facilities/Maintenance building with wider radius corners and more manageable slopes. Major buildings will have dedicated loading areas accessible from the service drive.

COMMISSARY

Animal Care staff primarily prepare and store animal nourishment at the commissary. The commissary is accessed throughout the day as food deliveries come into the zoo and as keepers take prepared food out to the animals. Much of the existing commissary’s built-in systems no longer meets the current animal care functions, and the proposed new animals in the Master Plan will have different dietary requirements. The Master Plan includes a new commissary designed with a flexible equipment and food storage system as well as a functional food prep zone to create efficiencies. The Commissary is separated from the Administration Buildings the Commissary to minimize vehicle-people conflicts.

SNOW REMOVAL

The City of Edmonton experiences significant annual snowfall, typically between October and May. While levels fluctuate year-to-year, Edmonton typically has at least a centimeter of snow a third of the year, with a mid-winter average snowpack of approximately 18 cm.

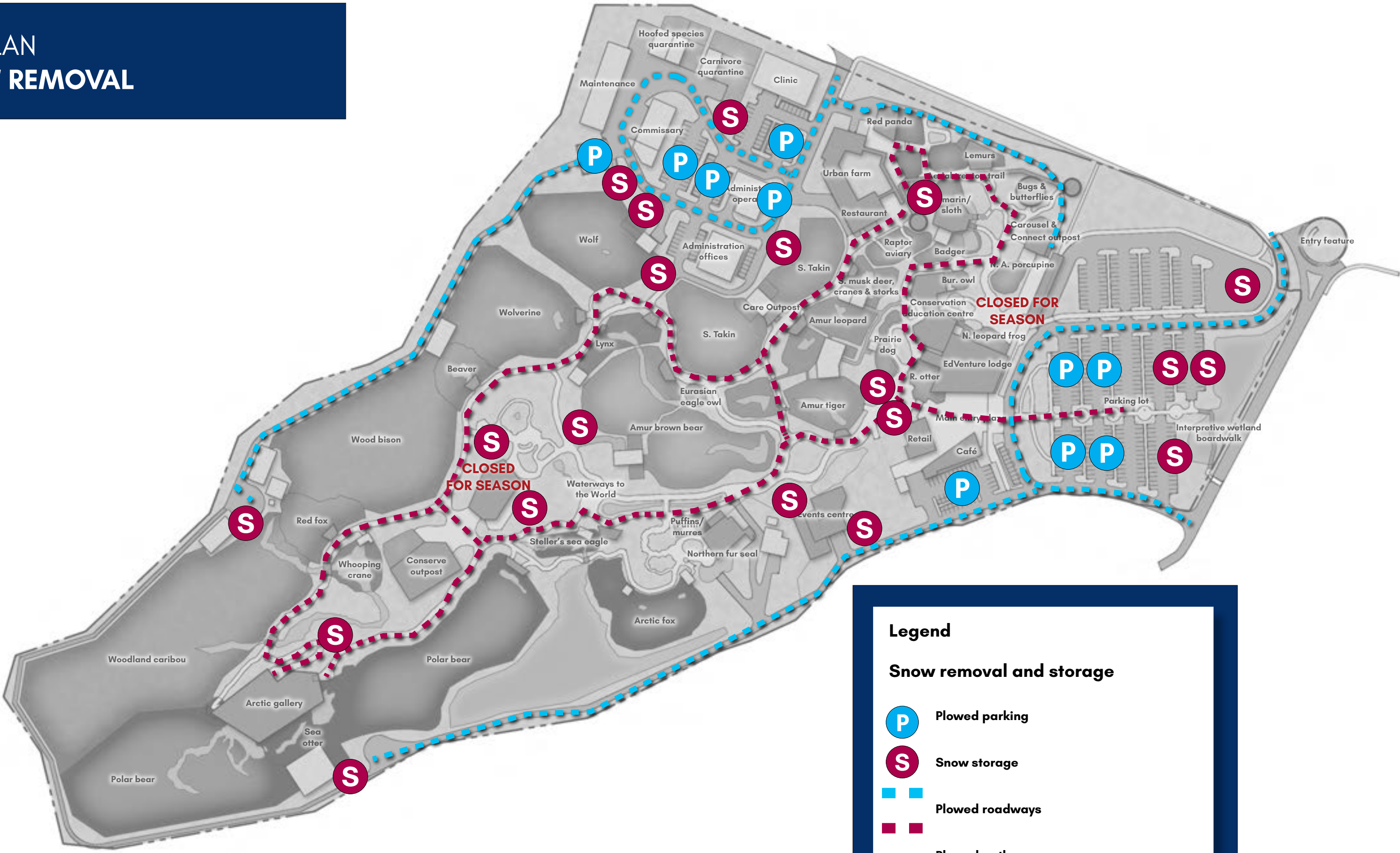
The Edmonton Valley Zoo maintains its primary visitor pathways and service areas to ensure the safety of visitors and staff. As part of the Master Plan, new indoor storage for snow removal equipment is included in the new Facility Maintenance building in the Administration/Back-of-House area. Keeping equipment warm helps ensure it is ready to operate whenever the need arises.

Snow in Edmonton does not tend to melt as quickly as other parts of the province, so the Zoo must address snow storage. Removal is not cost-effective or practical, and piling snow in one location is not efficient.

The Master Plan identifies areas across the Zoo site where snow could be piled in smaller, more regularly distributed locations (see next page). These areas can be multi-purpose, serving as dry stormwater ponds or LID facilities in the summer months, and holding snow in the winter. Snow pile areas should inform landscaping and public fence layouts, as pushing snow through fences or piling onto horticultural beds is not ideal. As visitation is reduced in winter months, pathway corners can also be used to hold snow without impeding visitor flow.

The parking lot is a significant source of snowfall accumulation and must be plowed in the winter. With reduced parking demand in the winter months, sections adjacent to the constructed wetland and in the overflow/oversized vehicle section of the parking lot can be used for snow storage. Snow storage should not impede daily operations, but with fewer seasonal staff in the winter months, some parking areas may be used for snow storage if needed.

SITE PLAN
SNOW REMOVAL



NOT TO SCALE

Legend

Snow removal and storage

-  Plowed parking
-  Snow storage
-  Plowed roadways
-  Plowed pathways