psturje

BRITANNIA BEACH SOUTH

SITE DEVELOPMENT MASTER PLAN

VOL. 2 OF 5 - MASTER SERVICING PLAN

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Britannia Beach South
Site Development Master Plan
Vol. 2 of 5 - Master Servicing Plan

Submitted to Client (Group):

Tiger Bay Development Corporation
Physical address:
27154 Sea-To-Sky Highway 99, Britannia Beach, BC, V0N 1J0
office: 604-896-2339, fax: 604-896-2336
Mailing and delivery address:
General Delivery, Box Number 195 27154 Sea-to-sky Highway 99 Britannia Beach, BC, V0N 1J0
Attn: Long Cheng, cel: 604-354-5908, long@southbritannia.com
Attn: Tony Petricevic, cel: 778-708-9111, office@southbritannia.com

Prepared by Consultant:

P.S.Turje & Associates Ltd.
1333 Inglewood Avenue, West Vancouver, BC, V7T 1Y8
Attn: Paul Turje, P.Eng., paul@turje.ca, 604-619-1407 (project engineering coordinator)

Submitted by: Paul Turje, P.Eng.

Submission Date: 2020-05-31

Study Limitations:

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BACKGROUND

This set of documents is a site development master plan for a new community referred to as Britannia Beach South, located in the Squamish Lillooet Regional District (SLRD) beside Howe Sound and flanking Highway 99 (the Sea-to-Sky highway). The owner and proponent of the development concept is Tiger Bay Development Corporation.

The Master Plan consists of the following five documents:

Volume 1 of 5: Summary – This volume extracts the summaries and phasing plan from the Details volume. The reader should reference the Drawings volume when reading this summary.

Volume 2 of 5: Master Servicing Plan (this document) – This volume extracts only the phasing plan from Volume 3 together with the drawings *Site Plan – Interim* and *Site Plan-Final* .

Volume 3 of 5: Details – This volume contains the full text of the master plan together wilth many figures that will aid the reader's understanding. The reader intrepid enough to wade into this volume should also refer to the Drawings and Reference volumes.

Volume 4 of 5: Drawings – This volume includes full-sized drawings.

Volume 5 of 5: Reference – This volume contains consultant reference reports.

Site investigations undertaken for this plan include the "usual suspects": geotechnical, stream flood hazard, soil contamination, environmental, water table level monitoring, well drilling and aquifer testing. The specialist team for these investigations includes the following disciplines: geotechnical, hydrogeological, stream hydrology and hydraulics, transportation, traffic, wastewater treatment, environmental, contaminated site assessment, all coordinated and integrated by civil engineering. The master plan is conceptual; therefore, it purposely omits reporting on many details, that were actually developed to confirm feasibility, to focus on the bigger picture.

The term "site development" in this report is used to describe not only the conventional utilities such as water and sewer but also grading, erosion protection, flood protection, environmental protection and mitigation and similar topics.

OBJECTIVE

The objective of this master plan is to advance the investigations and planning to a sufficient level of detail to either completely confirm that an element is feasible (e.g. water supply and distribution) or that it is highly likely that a component can be resolved (e.g. debris flow).

The reader might wonder why the development team did not fully resolve all of the issues. The reasons are twofold:

- Some agencies wish to defer review or comment on a development proposal until the local government has ratified the development proposal. This leads to a classic "chicken and egg" dilemma. For example, the provincial environment ministry will only review the mitigation plan for riparian areas at an advanced design stage because they do not have the resources to

comment on preliminary planning proposals. Other agencies include MoTI, CN Rail, Fisheries, Ministry of Health and others.

- The proponent wishes to receive an indication that the development proposal enjoys the conditional support of the SLRD before committing to additional expensive and lengthy technical studies. In other words, are non-technical issues (political, social, administrative, etc.) standing in the way of approval? For this reason, the proponent is seeking First Reading as an indication of conditional support for the project before completing the technical tasks.

DEVELOPMENT FRAMEWORK

The site is approximately 55 kilometres (34 miles) north of the city of Vancouver, 33 kilometres (21 miles) north of Horseshoe Bay, and 12 kilometres from Porteau Cove. The development area is immediately south of Britannia Beach (Britannia Beach North), a community of approximately 300 residents and associated historical mining facilities, including the Britannia Mining Museum. The area is unorganized (not within a municipality) and under the jurisdiction of the SLRD. The Ministry of Transportation and Infrastructure (MoTI) is the approving authority.

The site occupies an abandoned gravel pit that has an extensive gently sloping area at low elevations flanked by steep slopes left behind by the mining operation. The soils under the proposed development areas consist of alluvial fan and outwash sediments that provide a suitable foundation for the proposed structures and utilities, are not susceptible to liquefaction during an earthquake and are not vulnerable to frost heaving. The lowest portion of the flat area is within the sea flood boundary and will require minor filling or raising of structures. The steep slopes are geotechnically stable, but some areas should be regraded and revegetated to provide a more erosion-resistant slope. The flat portion of the site has a high seasonal water table, which will limit the practical construction depth of structures.

Four streams with associated riparian borders traverse the site. The streams, the steep upland slopes to the east and the highway and railway are the main “form-makers” of the site. These features delineate development parcels that will be either used by the owner or sold to other developers to use in a manner consistent with the master development agreement.

Most of the development site lies entirely within previously disturbed land that has low environmental value. The margins of Gravel, Thistle and Daisy Creeks have regenerated a poor quality riparian boundary. The smallest stream, Minaty Creek, is intact, but its small size limits its environmental value. The three larger streams also present a debris flow hazard that requires mitigation. All streams are ephemeral and are dry during summer.

The lowest portion of the northern gravel pit is below the seasonal high water table. It has subsequently formed ephemeral pools and wetlands that are protected by the Riparian Area Regulation (RAR). A large area of this pool and wetland area is proposed to be used for development, and the lost area will be compensated by the construction of a higher quality pool and wetland complex. All riparian areas have also been widened beyond the minimum. The proposed riparian area is 102% of the existing riparian area.

The northern portion of the proposed development includes a large artificial surf pool (Wavegarden) with associated operations and guest facilities, including a 50-unit “surf hotel” and a separate brew-pub restaurant. The Wavegarden accommodates a maximum of 100 surfers at a time and a limited number of guests using the Wavegarden’s “beach” areas. Because of the limited number of concurrent users, the

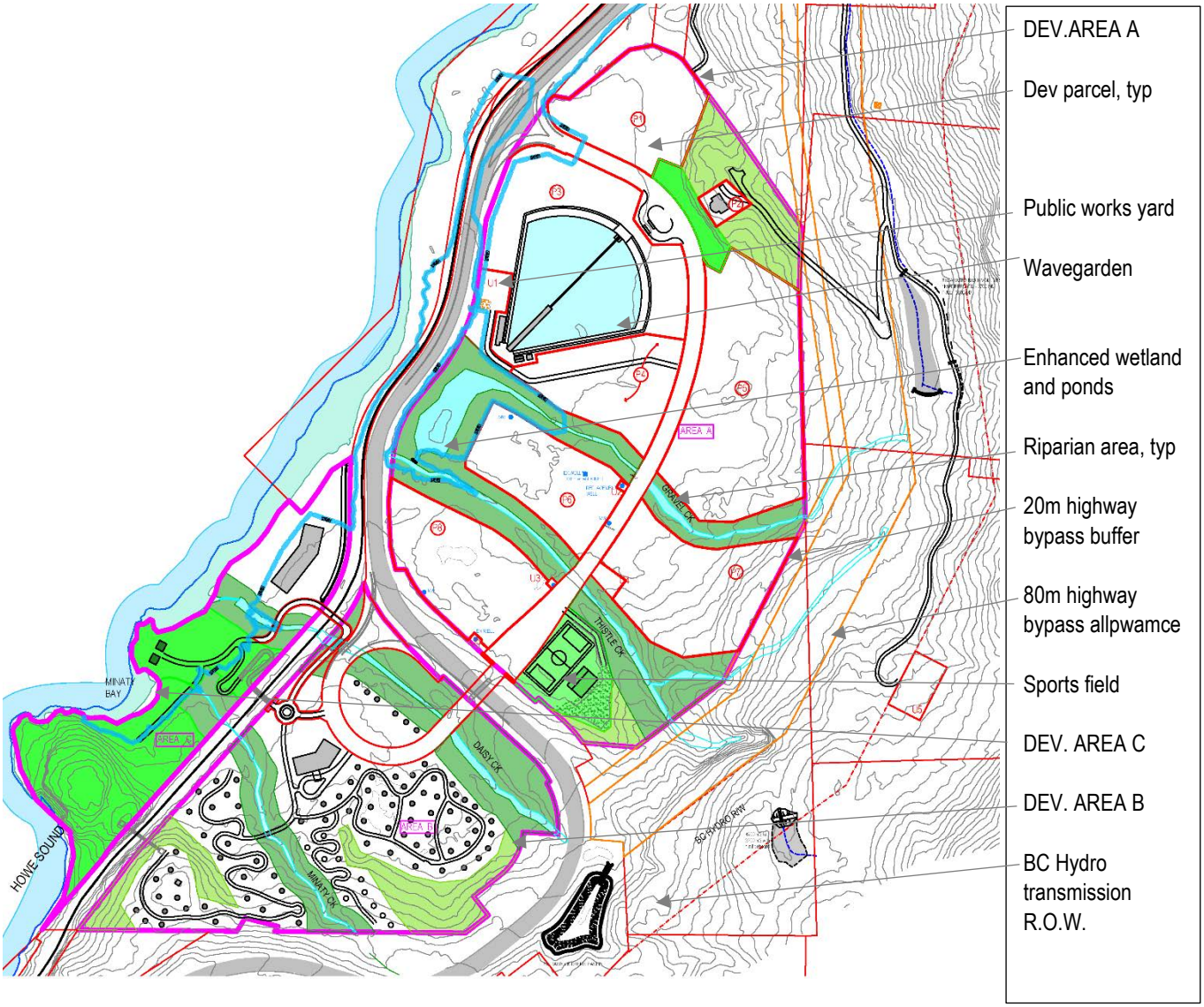
facility does not generate significant traffic loading. A mountain bike pump track is located between the Wavegarden and Highway 99. This provides an alternative semi-commercial attraction.

The remaining portions of the northern development area will be occupied by 1050 units of townhouses and apartments, the maximum amount permitted by the SLRD's Official Community Plan. The developer intends to maximize the number of townhouses with the balance of units being apartments. The residential area will include a small amount of local commercial and will include the usual parks, trails, paths, sports field & field house and other amenities. Some trails and paths will be routed through the riparian areas to provide "nature routes" where the disturbed area is compensated by additional riparian width. Other paths will be routed through the development parcels to offer more direct pedestrian routes through neighbourhoods. These cross paths will be a requirement of the development agreements for each parcel.

The portion of the site located south of the Highway 99 "S-bends" will be retained by the owner and used for tourist accommodation consisting of a 30-unit waterfront lodge, 30-unit resort, and 80-units of cabins and "glamping" sites sprinkled over the hillside. The waterfront lodge is separated from the resort / cabin site by the CN Railway. The majority of the waterfront site will be dedicated as a rustic and undeveloped regional park owned and operated by the SLRD.

Figure 1 illustrates the site, and the three Development Areas A, B and C. Area A contains the Wavegarden, park, sports field and eight development parcels. The remaining areas include the tourist facilities.

Figure 1: Development framework



MASTER SERVICING PLAN

Construction of the development will be phased over many years to suit market conditions and infrastructure sequencing.

Phase 1 (present - 2025)

Phase 1 development (also referred to as the Interim development) is illustrated on will include the Wavegarden, recreation area (pump track, skate park, etc.), brewpub and up to 20 cabins and glamping sites temporarily located beside the Wavegarden configured as a surfing village. The cabins/glamps will be relocated to Area B in a future phase.

Access to the site will be provided by the existing North Access only. Phase 1 will operate with interim servicing to allow deferral of many servicing elements. The utilities will be built to a long term but not municipal standard with the understanding that the interim facilities will be replaced by the permanent facilities in subsequent phases. The intention is to allow the site to be occupied for an indeterminate time without the need to initially build the expensive full build-out services.

All roads and utilities in Phase 1 will be private and will be built and operated by Tiger Bay. Servicing elements that will be incorporated into the final servicing will be built to SLRD and MoTI standards with the details of inspections and approvals to be negotiated.

Phase 1 site development and utilities are illustrated on the drawing entitled *Site Plan, Interim* and will include the work described below.

Grading

- Raise the site sufficiently to allow permanent buildings to be constructed to a flood construction level of 5.0 m. The cabins will be portable and will not be flood-proofed as they can be vacated if a flood is imminent. Floods depths are very low and the only hazard is to property, not life.

Stream and debris hazard protection

- Regrade and stabilize the steep slopes surrounding the upland area of Gravel Ck.
- Realign Gravel Creek into its final configuration complete with training berms, channel hardening and bank erosion protection in the steep upland area.
- Construct the small debris basin and associated works on Daisy Ck.
- Confirm if a debris flow on Daisy Ck can affect the Interim Phase 1 development and how this can be mitigated. It is unlikely that the Wavegarden will be affected as it will be raised significantly to mitigate high water table. The brew pub will likewise be raised to conform to the generally raised site required to conform to the raised Wavegarden. The cabins, being temporary, are not intended to be raised but this might prove to be necessary. The need for debris flow mitigation will be confirmed by ongoing hazard studies.

Environmental mitigation

- The Wavegarden will occupy a substantial portion of the existing riparian areas associated with the Gravel Ck wetlands. Phase 1 will include construction of the new wetland and pond system, new riparian areas surrounding the realigned Gravel Ck, and retention of the existing riparian areas in Parcel P6 that are not used for development in this phase.

- The permanent riparian areas set aside in Phase 1 will be smaller than the area lost to development. We anticipate the need to negotiate a suitable agreement with the environmental agencies, that might be registered as a covenant on title, to provide assurance that the total agreed upon riparian compensation will ultimately be provided.

- Establish covenants over the permanent riparian areas related to Gravel Ck and the new wetland/pond.

Roads, parking and paths

- Construct minor improvements to the existing North Access including an improved northbound deceleration lane and ramp into the site and an improved northbound ramp with acceleration lane out of the site, while maintaining operation as a full movement stop-controlled intersection.
- Build a short section of Britannia Blvd. from the North Access to a temporary roundabout at the intersection of Britannia Blvd and the service road to the public works yard. This will provide access to the Wavepark, surface parking lot, brewpub, cabins and the farmer's market. Note that the farmer's market is a separate initiative that incorporates its own parking lot. This road will be a private two-lane road using seal coat surfacing with gravel shoulders and ditches.
- Gravel surfaced two lane 6m wide service road from Britannia Blvd. to the works yard and Wavegarden operations buildings. This road will also provide access to the 20 cabins.
- A gravel-surfaced guest parking lot with lighting and interim landscaping using native drought resistant plants.
- Upgraded private access road from the Ph.1 Britannia Blvd. through the culvert underpass, CN Rail surface crossing and to Minaty Bay. The service road will be used for operations and maintenance access to the property and for fire protection access in the event of a wildfire. The access road will continue to use the existing highway underpass and stream crossing bridges and culverts.
- Upgraded CN Rail private surface crossing to conform with permit requirements.
- Interim street lighting mounted on overhead utility poles and pedestrian lighting along formal pedestrian paths.

Water

The Phase 1 water system consists of the following components:

- Outfit both existing wells (TW1 & TW2) with 25 L/s pumps with VFD control, pumping through the raw water watermain installed in its permanent location to the Wavegarden operations centre and Public Works Yard that will contain a containerized interim water treatment plant. This water will be used untreated for filling the Wavegarden pool and treated for supplying potable water demands of the Wavegarden, brewpub, market and cabins. The pumps are controlled by the water level in the ground-level reservoir. Note that the well capacities will fluctuate seasonally so use well level sensors to control the VFD to limit the well pumping rate to avoid over-pumping the wells.
- Permanent raw water main from the wells to the interim water treatment plant that is located in the Works Yard. The raw water main will supply untreated water to the treatment plant and to the Wavegarden for pool filling. It will also supply 50 L/s fire flow from the wells through a cross-connection to the future domestic water distribution main noted below.
- Containerized water treatment plant in the Public Works Yard containing a 1-hour volume flow equalization tank, pH adjustment, filtration, UV disinfection and chlorination sized to provide Ph.1 potable water demands.
- Treated water main from the treatment plant to the ground level reservoir. The UV treatment allows direct discharge of the treated water into the reservoir without providing additional chlorine contact time.

- Bolted steel ground level water storage reservoir sized for two days of emergency supply, flow equalization and cabin fire sprinkler storage for the Phase 1 development.
- Containerized potable water booster station to pump domestic and cabin fire sprinkler demands through small diameter water mains from the reservoir to the Ph. 1 buildings.
- 100 mm (4") high density polyethylene treated water distribution loop around the Wavegarden that will be used in the final configuration as an irrigation supply pipe.
- Build the future water distribution mains in Britannia Blvd and the service road complete with fire hydrants. Cross-connect these distribution mains to the raw water supply pipe from the wells to distribute raw water to the hydrants for fire protection.
- Fire hydrants on the large diameter water distribution main to supply fire trucks and fire mains to the fire sprinklers in the brewpub and Wavegarden buildings. The well pumps will supply the sprinkler flows. This strategy is subject to the approval of the fire commissioner and the insurance underwriters.

Sewer

- Permanent gravity sewers from the Wavegarden, brewpub, cabins and farmer's market to the permanent sewage lift station.
- Permanent sewage lift station with temporary smaller capacity sewer pumps and electrical controls and switchgear.
- Permanent sewage forcemain from the lift station to the Britannia wastewater treatment plant.
- Wastewater treatment plant upgrading necessary for the Phase 1 sewer flows.

Landscaping

- Permanent landscaping for the Wavegarden, recreation area, and brewpub.
- Temporary landscaping for the cabin village, roads and surface parking lot.

Power and communications

- Extend a permanent large capacity overhead electrical service from the BC Hydro transformer station above the Britannia mine building to the Wavegarden, brewpub and the service building for the cabins. This will require upgrading of the transformers at the transformer station.
- High speed wired and wireless internet and CCTV.

Drainage

- All drainage will use surface ditches and swales discharging into ground, constructed rain gardens or to the drainage detention pond associated with the Public Works Yard.

Phase 2 (2026-2030)

Phase 2 initiates construction of the permanent core utilities to service the initial phases of residential and commercial development in Parcels 1, 2, 4, 5 and 6 and the tourist accommodations in Area B. Phase 2 servicing will require most of the permanent "buildout" utilities and services that are illustrated on *Site Plan – Final.*

Developers of each of the development parcels will be responsible for planning, designing and building full servicing for each development parcel including private road or driveway entrance onto Britannia Blvd, metered utility connections for water and sewer, on site drainage, detention and overflow to the discharge location noted on Dwg. 2. The private services in Area B are not included in the following list.

The following elements of the buildout drawing are included in Phase 2.

Grading

- Regrade and stabilize the steep slopes in Parcel P5 and Area B.

Stream and debris hazard protection

- Daisy Creek training berms and debris basin improvements identified by subsequent study.
- Thistle Creek debris basin and channel training.

Environmental mitigation

- Complete Thistle Creek and Daisy Creek riparian area upgrading.

Roads, parking, paths

- North Access built to final configuration.
- South Access built to final configuration
- Upgraded highway underpass. The extent of upgrading or replacement will be determined through negotiations with MoTI and is currently uncertain. It will consist at least of structural upgrading of the existing underpass and configuration as a signalized single lane underpass.
- Britannia Boulevard connecting the North Access to the South Access built to final configuration complete with paving, boulevards, multi-use trail, pedestrian crossing, rain gardens, parking and lighting.
- Permanent stream crossings over Gravel, Thistle and Daisy Creeks.
- Restricted access service road from Britannia Blvd to the existing CN Rail surface crossing. It remains to be determined if this crossing will remain private or if it will be located in a statutory right of way for restricted public use to service the park and the future waterfront lodge.
- Minor upgrading of the BC Hydro access road to provide all weather access to the reservoir site.
- Public path through the Daisy Ck riparian area.
- Public path beside Thistle Ck located in the water main easement.

Water

- Decommission temporary water treatment, storage and pumping at the Public Works Yard.
- Drill one or two additional wells (contingent on yield) at locations PW#1 and PW#2 and outfit all wells with VFD controlled pumps. Reconfigure maximum pumping rates to match well capacity and so that total yield remains below the environmental review threshold of 75 L/s.
- Connect new wells to the Ph. 1 raw water main. Extend the raw water main to the water treatment plant.

- Construct one of two 50% capacity treatment trains at the new water treatment plant.
- Build the treated water supply main to the reservoirs.
- Build the final configuration of reservoirs. Both reservoirs are required for reliability, serviceability and for fire protection capacity.
- Water distribution main from the reservoir to the Britannia Blvd water distribution main.
- Water distribution main from the north side of the Highway 99 casing pipes connecting to the interim distribution mains in Britannia Blvd.
- Water main connection between N. and S. Britannia with pressure regulating station.

Sewer

- Decommission Phase 1 temporary sewer works.
- Extend force main and gravity sewers from the proposed Highway 99 sewer casing pipe along Britannia Blvd to connect to the interim sewer main in Britannia Blvd.
- Outfit the sewage lift station with full capacity pumps and controls.
- Upgrade the wastewater treatment plant to accept flows from Phase 2.

Power and communications

- Extend power and communication ducts and cabling through the length of Britannia Blvd. between the North and South Access.

Drainage

- Construct the permanent drainage facilities in Britannia Blvd including minor system piping, rain gardens, the works yard detention pond and the permanent major system flow paths.

Phase 3

Remaining infrastructure as required including:

- Second treatment train in the water treatment plant when required.
- Upgrading of the sewage treatment plant to service anticipated flows.
- CN Rail pedestrian overpass if required by subsequent negotiations.
- Upgraded existing service road to the cliff top park and restaurant.
- Remainder of paths and trails
- Regrade and stabilize the steep slopes in Parcel 8.
- Restricted access public service road through Area C (waterfront lodge) to the regional park.
- No additional works required.
- No additional works required.
- No additional power or communication works required.
- Additional drainage works required.

DRAWINGS

This section includes the following drawings:

Site Plan – Interim

Site Plan - Final

NOTES:

1. **SCOPE OF DRAWING**: THIS DRAWING ILLUSTRATES THE PHASE 1 DEVELOPMENT. REFER TO ENGINEERING REPORT FOR DESCRIPTION. FACILITIES INCLUDE WAVEGARDEN, BREW PUB, 20 CABINS AND SERVICE BUILDINGS. THE ENTIRE DEVELOPMENT IS ON PRIVATE PROPERTY. ALL ROADS AND UTILITIES ARE PRIVATE.
2. **SEWERAGE**: GRAVITY SEWERS DISCHARGE TO FUTURE PERMANENT SEWAGE LIFT STATION (LS) THAT USES A 3000 MM WET WELL, ELECTRICAL KIOSK, STANDBY GENERATOR, WATER BACK-FLOW PREVENTER KIOSK & SEWER FLOW METER KIOSK. SEWER FORCE MAIN FROM LS IS ROUTED ALONG PROPERTY BOUNDARY TO BRITANNIA NORTH AND THEN ALONG HWY 99 RIGHT-OF-WAY, ATTACHED TO BRITANNIA CK HIGHWAY BRIDGE, THEN TO WASTEWATER TREATMENT PLANT (WWTP) UPGRADED BY TIGER BAY DEV CORP. USE MINIMUM PIPE SIZE FOR FORCE MAIN TO REDUCE SEPTICITY/ODOUR OF DISCHARGE AT WWTP. SEWER FORCE MAIN ROUTED IN COMMON TRENCH WITH GRAVITY SEWER WHERE POSSIBLE.
3. **WATER**: WATER SUPPLY IS PROVIDED BY EXISTING TEST/PRODUCTION WELLS. EACH WELL OUTFITTED WITH 25 L/S PUMP WITH STANDBY GENERATOR & ELECTRICAL PANEL. UNTREATED RAW WATER IS PUMPED THROUGH RAW WATER MAIN TO WAVEGARDEN AND CONTAINERIZED WATER TREATMENT PLANT. TREATED WATER IS STORED IN A GROUND LEVEL BOLTED STEEL RESERVOIR WITH STORAGE FOR TWO DAYS CONSUMPTION LOCATED IN PUBLIC WORKS YARD.FIRE PROTECTION IS PROVIDED BY THE WELL PUMPS PUMPING INTO THE PH.2 TREATED WATER MAIN. DOMESTIC FLOW FOR PH. 1 IS DISTRIBUTED THROUGH TEMPORARY 100 MM PIPE IN COMMON TRENCH WITH PERMANENT PIPES.
4. **DRAINAGE**: SITE LOW POINT IS THE SMALL DETENTION POND BESIDE THE WORKS YARD AND THE WETLAND POND SYSTEM AT ELEVATION AT NOMINAL 4.0 M ELEVATION. ACCESS ROAD AROUND WAVEGARDEN IS NOMINAL 6.0 M ELEVATION. ROADSIDE DITCHES DRAIN TO DETENTION POND.
5. **ROAD**: THE NORTH ACCESS HIGHWAY INTERSECTION USES THE EXISTING INTERSECTION CONFIGURATION WITH LARGER RADIUS RIGHT IN AND RIGHT OUT MERGE LANES THAT WILL BE ABANDONED WHEN THE PHASE 2 INTERSECTION IS CONSTRUCTED. THE MAIN PRIVATE ROAD ONSITE USES TWO PAVED 3.0M TRAVELLED LANES, 0.6M GRAVEL SHOULDERS WITH DITCHES. PAVEMENT IS SEALCOAT RATHER THAN HOT MIX ASPHALT. PRIVATE SERVICE ROAD TO WORKS YARD IS 5.O M GRAVEL SURFACE WITH 0.6M GRAVEL SHOULDERS AND DITCHES BOTH SIDES. PRIVATE ACCESS ROAD FROM ROUNDABOUT TO THISTLE CK. BRIDGE IS 5M WIDE GRADED EARTH ROAD USING NATIVE MATERIAL, NO SHOULDERS, ELEVATED 0.5M ABOVE EXISTING GROUND SURFACE, NO DITCHES.
6. **POWER**: POWER AND COMMUNICATIONS OVERHEAD.
7. **FLOOD HAZARD**: SEA FLOOD IS MITIGATED BY BUILDING ALL OCCUPIED STRUCTURES ABOVE THE FLOOD CONSTRUCTION LEVEL OF 5.0 M ELEVATION. ROAD SURFACES WILL BE BUILT ABOVE THE FLOOD LEVEL OF 4.4 M. STREAM FLOOD HAZARD OF GRAVEL CREEK IS MITIGATED BY BUILDING THE STREAM BED SUFFICIENTLY BELOW THE SURROUNDING LAND TO CONTAIN THE 1:200 YEAR FLOOD. SETBACK CONTAINMENT DYKES ARE USED IN AREAS THAT MIGHT BE SUBJECT TO STREAM AVULSION. THISTLE AND DAISY CREEKS DO NOT IMPACT THE PROPOSED PHASE 1 DEVELOPMENT AREA.
8. **DEBRIS FLOOD HAZARD** OF GRAVEL CK IS MITIGATED BY CONSTRUCTION OF A SMALL DEBRIS BASIN IMMEDIATELY ABOVE THE STEEP SLOPE LEADING TO THE DEVELOPMENT AREA. THE DEBRIS BASIN WILL CONTAIN THE ESTIMATED 1:2500 YEAR DEBRIS FLOW VOLUME. THE DEBRIS BASIN WILL CONSIST OF A DAM WITH OVERFLOW CULVERTS, OR A STEEP OUTLET CHANNEL WITH DEBRIS NETS ANCHORED INTO THE CHANNEL WALL. THE TAIL END OF A DEBRIS FLOWS ON DAISY CK AND THISTLE CK MIGHT EXTEND AS FAR AS THE WAVEGARDEN SITE BUT WILL BE MITIGATED BY RAISED CONSTRUCTION OF THE WAVEGARDEN AND THE SERVICE ROAD TO THE PUBLIC WORKS YARD.
9. **STREAM EROSION HAZARD** FOR GRAVEL CREEK IS MITIGATED BY AN ARMORED CHANNEL DOWN THE STEEP SLOPE AND ARMORED SETBACK DYKES WHERE THERE IS A POTENTIAL OF STREAM AVULSION.
10. **WETLAND AND RIPARIAN** AREAS ARE RECONSTRUCTED AS SHOWN. PHASE 1 RECONSTRUCTION WILL REQUIRE A NET LOSS OF RIPARIAN AREA THAT WILL BE COMPENSATED BY EXPANSION OF OTHER RIPARIAN AREAS AND CONSTRUCTION OF IMPROVED RIPARIAN AREAS AT THE WETLANDS WITH A 4 TO 5M DEEP WETLAND POOL.

LINE LEGEND:

- EDGE OF ROAD
- PATH
- TRAIL
- FIRE SUPPLY USING FUTURE DISTRIBUTION MAIN (UNTREATED)
- WATER SUPPLY / FIRE SUPPLY FROM WELLS TO SURF POOL FACILITIES AND BREW PUB(UNTREATED)
- 100 MM DIA. PH.1 WATER DISTRIBUTION (TREATED) & FUTURE IRRIGATION.
- SEWER GRAVITY
- SEWER FORCE MAIN
- TRAINING BERM
- STREAM BED ARMOURING

SYMBOL LEGEND

- PRODUCTION WATER WELL
- MW MONITORING WELL
- CABIN OR GLAMPING SITE
- PROPOSED BUILDING

COPPER DRIVE
LIMIT OF FILL
SEWER FORCE MAIN TO WASTEWATER TREATMENT PLANT
HOWE SOUND
NORTH BRITANNIA
MINE MUSEUM
BC HYDRO TRANSFORMERS
HWY 99
HOWE SOUND
FINAL - SEWER FORCE MAIN CONNECTION TO NORTH BRITANNIA WASTE WATER TREATMENT PLANT
INTERIM - PH.1 IMPROVED N. ACCESS, RIGHT-IN / RIGHT-OUT & ADDITIONAL NORTHBOUND LANE. THIS WILL BE REPLACED IN PH.2 BY IMPROVED ACCESS AND HIGHWAY LANNING.
5M SEA FLOOD LEVEL
FINAL - SURF PARK
FINAL - SEWER UTILITY CORRIDOR
FINAL - PUBLIC WORKS YARD
FINAL - SEWAGE LIFT STATION
INTERIM - (PH.1) GROUND LEVEL STEEL RESERVOIR, WATER TREATMENT CONTAINER, PUMPING CONTAINER
FINAL - DECHLORINATION DETENTION POND FOR POOL DISCHARGE AND STORMWATER DETENTION
FINAL - PATH
FINAL - RECONSTRUCTED AND ENHANCED WETLAND AND 4M DEEP POOL REPLACES EXISTING WETLAND AND SHALLOW POOLS
INTERIM - RETAIN EXISTING WETLAND (PHASE 1)
FINAL - REBUILT RIPARIAN TO FUTURE BOUNDARIES
FINAL - INSTALL PERMANENT LEVEL LOGGERS IN THREE EXISTING MONITORING WELLS
INTERIM - EX.WELL USED AS PHASE 1 PRODUCTION WELL
FUTURE LODGE
FUTURE PARK
MINATY BAY
AREA C
FUTURE RESORT AREA
AREA B
HOWE SOUND
MINATY CK
HWY 99
CAP WATERMAIN
DRAINAGE PATH, TYP
WAVEGARDEN
INTERIM - GRAVEL SURFACED SERVICE ROAD
INTERIM - EX.WELL USED AS PHASE 1 PRODUCTION WELL
MW
FUTURE RELOCATED WELL
EARTH ACCESS ROAD
AREA A
INTERIM - 100 MM TREATED WATER MAIN DOMESTIC SUPPLY. CONVERT TO FINAL IRRIGATION MAIN IN PH.2.
ROAD ELEVATION 5.0M MINIMUM. ROAD AND GROUND GRADING TO SUIT FINAL ROAD AND DRAINAGE DESIGN
INTERIM - SEAL COATED PRIVATE ROAD WITH GRAVEL SHOULDERS AND DITCHES BOTH SIDES. BUILD TO FUTURE GRADE.
FUTURE TREATED WATER DISTRIBUTION MAIN USED FOR HYDRANT FIRE FLOWS TO SURF AND BREW PUB BUILDINGS
PH.1 CABINS/GLAMPS
PH.1 ROUNDABOUT
INTERIM - TEMPORARY CROSS CONNECTION BETWEEN RAW WATER MAIN AND FUTURE TREATED DISTRIBUTION MAIN
FINAL -RAW WATER SUPPLY FOR WAVEGARDEN FILLING, TREATMENT AND FIRE PROTECTION. LOCATE ALONG FUTURE ALIGNMENT
TRANSMISSION TOWER, TYP
WATERMAIN AND PATH CONNECTION BY PARCEL DEVELOPER IN PHASE 2. L DETERMINED BY PARCEL DESIGN.
MINOR DEBRIS BASIN (SEE THURBER REPORT)
EXCAVATED BASIN VOLUMES:
1M FREEBOARD - 2600 M3
FULL - 5700 M3
GRAVEL CK
TRAINING BERMS AND REVETMENTS
ARMOUR STREAMBED
THISTLE CK
EXISTING RIPARIAN REMAINS UNDISTURBED IN PHASE 1
DAISY CK
BC HYDRO R/W
EX. DAISY CK DEBRIS BASIN
EXISTING DEBRIS BASIN

PRINT DRAWING AT 1:2500 TO REVEAL DETAIL THAT MIGHT BE LOST AT A HIGHER SCALE

SCALES: 11 X 17 (1:5000) 22 X 34 (1:2500)

DWG 3 - SITE PLAN, INTERIM

N

BRITANNIA BEACH SOUTH DEVELOPMENT
TIGER BAY DEVELOPMENT CORPORATION

Prepared by: P.S.Turje & Associates Ltd. 2020-05-22

0M 100 200 300 400 500 600 700 800 900 1000 1100 1200

NOTES:

1. **SCOPE OF DRAWING**: THIS DRAWING ILLUSTRATES THE FULL BUILT-OUT DEVELOPMENT. REFER TO ENGINEERING REPORT FOR DESCRIPTION. THE SITE PROVIDES ACCESS AND UTILITIES TO LARGE DEVELOPMENT PARCELS WHICH ARE IN TURN SERVICED BY DEVELOPERS. ROAD AND UTILITY CONNECTION LOCATIONS TO DEVELOPMENT PARCELS WILL BE PLANNED AND PROVIDED BY DEVELOPERS. ALL FEATURES ARE CONCEPTUAL AND SUBJECT TO DETAILED DESIGN AND REVISION.
2. **SEWERAGE**: GRAVITY SEWERS DISCHARGE TO SEWAGE LIFT STATION (LS) THAT USES A 3000 MM WET WELL, ELECTRICAL KIOSK, STANDBY GENERATOR, WATER BACK-FLOW PREVENTER KIOSK, SEWER FLOW METER KIOSK. SEWER FORCE MAIN FROM LS IS ROUTED ALONG PROPERTY BOUNDARY TO BRITANNIA NORTH AND THEN ALONG HWY 99 RIGHT-OF-WAY, ATTACHED TO BRITANNIA CK HIGHWAY BRIDGE, THEN TO UPGRADED WASTEWATER TREATMENT PLANT (WWTP). USE MINIMUM PIPE SIZE FOR FORCE MAIN TO REDUCE SEPTICITY/ODOUR OF DISCHARGE AT WWTP. SEWER FORCE MAIN ROUTED IN COMMON TRENCH WITH GRAVITY SEWER WHERE POSSIBLE.
3. **WATER**: WATER SUPPLY IS PROVIDED BY EXISTING TEST/PRODUCTION , ONE NEW WELL AND ONE REPLACEMENT WELL. EACH WELL IS OUTFITTED WITH A 25 L/S PUMP WITH STANDBY GENERATOR ELECTRICAL PANEL. MAXIMUM PUMPING CAPACITY IS LIMITED TO 75 l/S TO NOT EXCEED STATUTORY LIMIT FOR ENVIRONMENTAL ASSESSMENT. UNTREATED RAW WATER FROM WELLS IS PUMPED THROUGH RAW WATER MAIN TO WAVEGARDEN AND WATER TREATMENT PLANT. TREATED WATER IS PUMPED TO TWO HILL SIDE RESERVOIRS.
4. **DRAINAGE**: SITE LOW POINT IS THE WETLAND AND STREAM COMPLEX BESIDE HWY 99. DRAINAGE WORKS ARE GRADED TO THESE LOW AREAS. ALL DEVELOPMENT PARCELS WILL LIMIT POST DEVELOPMENT DISCHARGE TO PREDEVELOPMENT DISCHARGE. DRAWING INDICATES POSSIBLE DRAINAGE PATHWAYS AND ARE SUBJECT TO DETAILED DESIGN.
5. **ROAD**: MAIN COLLECTOR ROAD USES 22M WIDE R/W WITH 40 KM/HR SPEED LIMIT FOR IMPROVED SAFETY AND LIVEABILITY. COLLECTOR ROAD INCLUDES MULTI-USE PATH ON EAST SIDE AND TREED BOULEVARDS BOTH SIDES.
6. **POWER**: POWER AND COMMUNICATIONS WILL BE UNDERGROUND.
7. **STEEP SLOPES**: STEEP SLOPES AT THE EASTERN EDGES OF THE DEVELOPMENT AREAS WILL BE REGRADED TO A MINIMUM 2:1 SLOPE AND REVEGETATED.
8. **FLOOD MITIGATION** - SEA FLOOD IS MITIGATED BY LOCATING ALL STRUCTURES ABOVE THE FLOOD CONSTRUCTION LEVEL OF 5.6M AND ALL ROADS ABOVE THE FLOOD LEVEL OF 5.0M ELEVATION. STREAM FLOOD IS MITIGATED BY CONTAINING THE 1:200 YEAR FLOOD IN THE STREAM CHANNEL OR BETWEEN THE SETBACK DYKES. STREAM BED EROSION OF GRAVEL CREEK ON THE STEEP SLOPE IS MITIGATED BY CONSTRUCTING AN ARMOURED CHANNEL DOWN THE STEEP SLOPE.
9. **DEBRIS FLOW HAZARD MITIGATION** - DEBRIS FLOW HAZARDS FOR GRAVEL AND THISTLE CREEKS ARE MITIGATED BY CONSTRUCTION OF SMALL DEBRIS CATCHMENT BASINS LOCATED IMMEDIATELY UPSTREAM OF THE STEEP SLOPES LEADING TO THE DEVELOPMENT SITE AND BY USE OF ARMORED DEFLECTION BERMS IN AREAS OF POTENTIAL CHANNEL AVULSION. DEBRIS FLOW HAZARD FOR DAISY CREEK IS MIITIGATED BY THE EXISTING MINISTRY OF TRANSPORTATION AND HIGHWAYS DEBRIS BASIN WHICH CAN CONTAIN THE 1:2,500 YEAR RETURN PERIOD DEBRIS VOLUME. CLEAR WATER OVERFLOWS OR DEBRIS FLOW VOLUMES IN EXCESS OF THE 1:2,500 YEAR EVENT WILL BE DEFLECTED AWAY FROM THE DEVELOPMENT USING A DEFLECTION BERM THAT RETAINS THE OVERFLOW WITHIN THE HIGHWAY RIGHT OF WAY. IN THE UNLIKELY EVENT THAT AN OVERFLOW IS NOT RETAINED WITHIN THE HIGHWAY, THE DEVELOPMENT HAS LOCATED A SPORTS FIELD, FIELD HOUSE AND COMMUNITY BUILDING IN THE POTENTIAL OVERFLOW AREA THAT WILL ACT AS A SECONDARY DEBRIS BASIN RETAINED BY THE ROAD EMBANKMENT LEADING TO THE HIGHWAY UNDERPASS TUNNEL.
10. ENVIRONMENTAL MITIGATION AND COMPENSATION - CONSISTS OF WIDENED AND ENHANCED RIPARIAN (SPEA) BORDERS AROUND CREEKS AND AN IMPROVED WETLAND POND BESIDE THE HIGHWAY. POST DEVELOPMENT SPEA IS 102% OF NATURAL SPEA.
11. SPOT ELEVATIONS ARE CONCEPTUAL TO PROVIDE AN INDICATION OF GRADING CONCEPT.

LINE LEGEND:

- EDGE OF ROAD
- LEGAL BOUNDARY (EXISTING AND PROPOSED)
- PATH
- TRAIL
- WATER DISTRIBUTION (TREATED)
- WATER SUPPLY (UNTREATED)
- SEWER GRAVITY
- SEWER FORCE MAIN
- STORM SEWER / DRAIN
- TRAINING BERM
- STREAM BED ARMOURING

SYMBOL LEGEND

- PRODUCTION WATER WELL
- MW MONITORING WELL
- CABIN OR GLAMPING SITE
- PROPOSED BUILDING
- DETENTION POND
- DRAINAGE FLOW PATH
- DITCH
- ROAD SLOPE / MAJOR DRAINAGE FLOW PATH

LAND USE

- STREAM / WETLAND (15,840 m2)
- ENVIRONMENTALLY SENSITIVE (RIPARIAN) (84,559 m2)
- NATURAL (36,546 m2)
- PARK (58,597 m2)

PARCELS, m2

P1	20244
P2	2080
P3	48806
P4	5458
P5	11010
P6	44248
P7	19353
P8	26905
P9	23557
TOTAL	203025

AREAS, m2

AREA A	324816
AREA B	141027
AREA C	68525
TOTAL	534368

COPPER DRIVE
LIMIT OF FILL
NORTH BRITANNIA
SEWER FORCE MAIN TO WASTEWATER TREATMENT PLANT
WATER MAIN CONNECTION TO N. BRITANNIA SYSTEM
MINE MUSEUM
HWY 99
BC HYDRO TRANSFORMERS
WATER PRESSURE REGULATING STATION FOR EMERGENCY WATER SUPPLY TO N.BRITANNIA
PATH, SEWER FM & WATER MAIN TO NORTH BRITANNIA IN 6M R/W
SEA FLOOD BOUNDARY, 5.0M
HOWE SOUND
CROWN LAND
DEVELOPMENT AREA BOUNDARY, TYP
SEWER FORCE MAIN CONNECTION IN PHASE 1
WATERMAIN AND PATH CONNECTION PROVIDED BY PARCEL DEVELOPER IN PHASE 2. LOCATION DETERMINED BY PARCEL DESIGN.
DRAINAGE PATH TO DETENTION BY DEVELOPER OF EACH PARCEL, TYP
CN RAIL
RECONSTRUCTED N. ACCESS, RIGHT-IN / RIGHT-OUT & ADDITIONAL NORTHBOUND LANE
TRANSIT LOOP
DRAINAGE FLOW PATH TO DETENTION POND BY DEVELOPER OF EACH PARCEL, TYP
POST DEV. SEA FLOOD BOUNDARY, 4.4M ELEVATION (HIGH TIDE+ SURGE+SEA LEVEL RISE)
SURF PARK
SEWER & DRAINAGE UTILITY CORRIDOR
PUBLIC WORKS YARD
SEWAGE LIFT STATION
DECHLORINATION DETENTION POND FOR POOL DISCHARGE AND STORMWATER
RAW AND TREATED WATER SUPPLY PIPES TO WAVEGARDEN
SURF PARK (WAVEGARDEN)
EX. BC HYDRO ACCESS. UPGRADE FOR PERMANENT SERVICE ACCESS TO DEBRIS BASINS, RESERVOIR, CLIFFTOP RESTAURANT. ROAD IS IN TIGER BAY PROPERTY IN BC HYDRO R/W.
EX. BC HYDRO ACCESS
TRANSMISSION TOWER, TYP
RESTAURANT
UPGRADE EXISTING ACCESS ROADS
UPPER GRAVEL CK. CHANNEL IS INDISTINCT. NEW ROADSIDE INTERCEPTOR DITCH DIRECTS CK. FLOW TO BASIN THROUGH LARGE CULVERTS AND ROAD SPILLWAYS.
EXCAVATED BASIN VOLUMES
1M FREEBOARD - 3700 M3
FULL - 6900 M3
RECONSTRUCTED AND ENHANCED WETLAND AND POOL
TRAINING BERM IN 5M EASEMENT, TYP
25M PRINCIPAL BUILDING SETBACK FROM STREAM BANK. RIPARIAN BOUNDARY EXTENDED TO GAIN MORE RIPARIAN COMPENSATION AREA.
RAIL PROTECTION BERM & SOUND FENCE
POST DEV. SEA FLOOD BOUNDARY AT EL. 5.0M IN AREA C (HIGH TIDE+SEA LEVEL RISE+SURGE+WAVE)
30 UNIT LODGE
LOW WAVE / EROSION PROTECTION BERM
6M WATERFRONT PUBLIC PATH R/W
UPGRADED EXISTING PRIVATE CN RAIL CROSSING
SOUTH ACCESS, RIGHT-IN / RIGHT-OUT
PRIVATE SERVICE ROAD OR PUBLIC ACCESS TO BEDETERMINED
3M WIDE PATH ON RETAINED SOIL WALLS
PAVILION & RESTROOMS
PUBLIC CN RAIL OVERPASS (PED, BIKE, CART) DECK EL 18.0+- & ACCESS R/W
30 UNIT RESORT & SERVICE BLDG FOR CABINS
LOOKOUT
MINATY BAY
AREA C
AREA B
AREA A
P1
P2
P3
P4
P5
P6
P7
P8
U1
U2
U3
U4
U5
U6
MW
EX WELL TO BE ABANDONED
REPLACEMENT WELL
NEW WELL
TERMINATE REGRADING AT 10.0M OR CONTINUE TO 5.0M TO GENERATE FILL MATERIAL
EX WELL
MID-PARCEL PATHS BY PARCEL DEVELOPERS, LOCATIONS TO SUIT, TYP
REGRADE AND APPLY EROSION PROTECTION
25 M PRINCIPLE BLDG STREAM SETBACK, TYP (TO BE CONFIRMED IF REQUIRED)
GRAVEL CK
HWY BYPASS ALLOWANCE, 80M
HWY BYPASS BUFFER, 20M
GRAVEL CK. DEBRIS BASIN USING DEBRIS NET OUTLET, DIRECT OUTLET FLOW TO EX. CREEK BED
TRAINING BERM & REVETMENT IN 5M EASEMENT, TYP
ARMORED CREEK BED
RAW WATER MAIN TO WELLS, TREATMENT & WAVEGARDEN
WATER TREATMENT PLANT
THISTLE CK
EL 15 +/-
EL.20 +/-
RES. OVERFLOW & DRAIN TO DECH LOR. POND
REGRADE AND APPLY EROSION PROTECTION
DAISY CK
MINATY CK
YOUTH SPORTSFIELD 40M X 80M, 54 STALL PARKING, AND COMMUNITY BLDG STEPPED INTO HILLSIDE. SITE ALSO FUNCTIONS AS DEBRIS HAZARD OVERFLOW BASIN
LOCATE TWO BOLTED STEEL RESERVOIRS OUTSIDE OF BC HYDRO R/W. BWL 110M. TWL 120M.
WATER SUPPLY MAIN, DISTRIBUTION MAIN & PATH
TRAINING BERM & REVETMENT, TYP
4900 m3 full
3200 m3 with 1m freeboard
THISTLE CK. DEBRIS BASIN (SEE THURBER REPORT). DAM WITH CULVERT OR CABLE NET. 4900 M3 FULL OR 3900 M3 WITH 1M FREEBOARD
TRAINING BERM & REVETMENTS, TYP
BLOCK STREAM AVULSION POINTS UPSTREAM OF DEBRIS BASIN (NOT SHOWN) REFER TO THURBER REPORT
TRAINING BERM & REVETMENT TIED INTO ROADSIDE BARRIER TO DEFLECT BASIN OVERFLOWS AWAY FROM DEVELOPMENT
PRIVATE PRESSURE SEWER EXTENSION INTO RESORT THROUGH CASING
IMPROVED ACCESS UNDERPASS TO BE DETERMINED
PRIVATE WATER SYSTEM EXTENSION INTO RESORT THROUGH CASING
EX. DAISY CK DEBRIS BASIN
BED & CHANNEL ARMOURING
IMPROVED APPROACH STREAM AND CULVERT ENTRANCE (BY MOTI)
EXISTING DEBRIS BASIN
SMALL DIA. PRESSURE SEWERS SERVICING CABINS
HWY 99
SMALL DIA. HDPE WATER SYSTEM SERVING CABINS AND LODGES IN AREA B AND C
POTENTIAL ACCESS AND CABINS ON STEEP SLOPE
SLOPES > 50%, REGRADE TO < 50% AND APPLY EROSION PROTECTION
PRIVATE PEDESTRIAN SUSPENSION BRIDGE

PRINT DRAWING AT 1:2500 TO REVEAL DETAIL THAT MIGHT BE LOST AT A HIGHER SCALE

SCALES: 11 X 17 (1:5000) 22 X 34 (1:2500)

DWG 4 - SITE PLAN, FINAL

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BRITANNIA BEACH SOUTH DEVELOPMENT
TIGER BAY DEVELOPMENT CORPORATION

Prepared by: P.S.Turje & Associates Ltd. 2020-05-22

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