MISSION
WETLAND & ECOLOGICAL SERVICES, LLC

September 25, 2020

Peter Britz, Environmental Planner/Sustainability Coordinator
City of Portsmouth New Hampshire
1 Junkins Avenue, 3rd Floor
Portsmouth, NH 03801

Re: Prime Wetland Buffer Enhancement Program
Greenleaf Woods Drive
Portsmouth, NH
Tax Map 243, Lot 6

Dear Mr. Britz,

Mission Wetland and Ecological Services, LLC (Mission) is hereby submitting the following Prime Wetland Buffer Enhancement Program (PWBEP) on behalf of Greenleaf Woods Condo Association (GLW) to support their property management goals to ensure the comfort, well-being, and safety of the occupants of the GLW office condominiums and to restore the original aesthetic component, the viewscape, of the valuable wetland/upland interface. The property is located on Greenleaf Woods Drive and accessed from Lafayette Road in Portsmouth, New Hampshire. The primary goal is to dissuade homeless individuals from trespassing and congregating which will be achieved through the secondary goal of long-term management of the existing dense understory community of invasive vegetation in order to open up the original viewscape of the GLW property. The 100-foot City of Portsmouth wetland buffer and the Prime Wetland Buffer (PWB) are associated with Prime Wetland #62, which is part and parcel of the Sagamore Creek Tidal Salt Marsh located in this densely-developed area of the G1 Gateway Corridor. During the Fall of 2019, your office, upon discovery that the site management contractor for GLW had removed the invasive shrub vegetation associated with the frontage of Buildings 1-3, approached GLW and informed they should discontinue vegetation management activities and retain the services of a wetland ecologist/consultant to assist them in implementing a management plan for the buffer issues and assist with any required wetland permitting. As such, Mission was retained, per your direction, for permitting assessment and to ensure that the activities would be undertaken with a sound ecological approach and with caution as to not create an urban landscape scene in the 100-foot buffer (PWB), and lose perspective of the function and value of this PWB.

Through substantial correspondence with the City of Portsmouth and the State of New Hampshire Department of Environmental Serives Wetlands Bureau and Shorelands Program, Mission has obtained feedback and confirmation that the proposed vegetation management approach is within the provisions of the Local and State regulations. Mission has prepared this PWBEP to guide GLW and their vegetation maintenance contractor through the vegetation management process with the intent of ensuring that these activities are done within the Local and State regulatory confines and compliance is met in the long term with ongoing invasive vegetation maintenance. With proper implementation of a sound and sensitive approach to managing the noxious and invasive vegetation within the wetland buffer (PWB), GLW can proceed following discussion of the PWBEP at Work Session with the Portsmouth Conservation Commission (PCC). While this represents a good-faith effort to inform the PCC of these activities, GLW will, with the guidance provided in this PWBEP, initiate the invasive species removal activities during the Fall of 2020.

Existing Wetland Buffer (PWB) Assessment

The Vegetated Buffer Strip (0-25 feet) and Limited Cut Areas (0-50 feet) as outlined in Section 10.1017.821(1) are encompassed in the 100-foot PWB (see attached Figure 1. Prime Wetland Buffer Map – Greenleaf Woods, Portsmouth, NH). Over time, the wetland buffer (PWB) has become colonized with low-quality, aggressive, extremely dense, and undesirable thorny and strangling vegetation. These buffer areas are vegetated with approximately 90% invasive shrub species, including substantial areal coverage of multiflora rose (*Rosa multiflora*), glossy buckthorn (*Frangula alnus*), and common buckthorn (*Rhamnus cathartica*), while tartarian honeysuckle

(*Lonicera tatarica*), and autumn olive (*Elaeagnus umbellata*) are present in smaller amounts (see the attached photographic log). These undesirable, aggressive, and invasive species possess growth habits that outcompete with native vegetation. Moreover, they are prolific seeders and also tend to propagate rapidly, thereby outcompeting the existing native vegetation. The existing native and desirable vegetation in the Vegetated Buffer Strip (0-25') and Limited Cut Area (0-50') buffers include red oak (*Quercus rubra*) white oak (*Quercus alba*), black oak *(Quercus velutina*), swamp white oak (*Quercus bicolor*), trembling aspen (*Populus tremula*), shagbark hickory (*Carya ovata*), red maple (*Acer rubrum*), eastern red cedar (*Juniperus virginiana*) and white pine (*Pinus strobus*) trees, as well as maple leaved viburnum (*Viburnum acerifolium*), black cherry (Prunus serotina), and staghorn sumac (*Rhus typhina*) shrubs and saplings in the upland buffer.

Wildlife observations in the wetland buffer (PWB) during the assessment include passerine songbirds such as gray catbird (*Dumetella caroliniensis*), American robins (*Turdus migratorius*), bluejay (*Cyanocitta cristata*), and mourning dove (*Zenaida macroura*), as well as great blue herons (*Ardea herodias*) feeding in the salt marsh. Mission also observed eastern cottontail rabbits (*Sylvilagus floridanus*), white-tailed deer (*Odocoileus virginianus*), and wild turkeys (*Meleagris gallopavo*) at the edge of the tidal salt marsh or the associated wetland buffer (PWB). In the managed portion of the upland buffer located behind Buildings 1 through 3, the invasive vegetation maintenance activities have opened up the forest floor and allocated resources of appropriate photoperiod, soil respiration, and throughfall precipitation which has created an opportunity for species like the existing large oak trees to drop acorns which are evidently germinating and are visibly flourishing in the understory.

Invasive Species Removal Activities

In order to properly implement an acceptable long-term invasive species maintenance program, and in consideration of the City of Portsmouth Zoning Ordinance Section 10.1017.25, the State of New Hampshire Wetland Rule provisions of Env-Wt 610.02 (c) and (g), and consistent with Env-Wq 1400, Mission has developed this PWBEP for GLW to ensure an ecologically sound, aesthetically consistent manner for them to manage this valuable wetland buffer (PWB) while maintaining a safe and comfortable workplace for the occupants of GLW. In order to maintain compliance with Env-Wt. 610.02 (g), any bare areas that exceed 10 square feet (SF) will be replanted with a random selection from the Table 1. Prime Wetland Buffer Enhancement Program Planting Schedule. In order to remain sensitive to the wetland buffer (PWB), GLW does not currently, and will not utilize pesticide applications and invasive woody species removal will be performed using hand tools while woody vegetation will be cut flush with the ground without stumping/grubbing, and the PWBEP planting activities will be conducted with as little soil agitation as is necessary. There are no proposed grading and/or drainage alterations associated with this PWBEP. Limited soil agitation will ensure that soil erosion does not occur which could result in sedimentation of the sensitive salt marsh/wetland buffer interface. No trees greater than 6" Diameter at Breast Height (DBH) have been removed to date and GLW does not propose the removal of existing trees greater than 6" DBH. Young Norway maple (*Acer platanoides*) saplings will be removed if they are smaller than 6" DBH as to reduce the probability of proliferation of this species, most notably near Buildings 6 and 7.

The PWBEP plantings will enhance the wetland buffer from which invasive woody vegetation have been removed. The invasive woody vegetation activities will restore the original viewscape of the salt marsh and enhance the value of Prime Wetland #62 with a complementary wetland buffer (PWB) that improves those functions and values of wildlife habitat, production export, aesthetic quality, uniqueness/heritage, and vegetation diversity. This will protect the Sagamore tidal salt marsh ecosystem through the colonization and planting of desirable herbaceous and woody recruits which may increase the opportunities for nutrient attenuation and sediment/toxicant retention for potential stormwater runoff and overland runoff. All of these components will initially stimulate the enhancement of the wetland buffer (PWB) and, over time, perpetuate a high value wetland buffer (PWB). In addition, this enhancement will discourage the propagation/encroachment of invasive vegetation in the direction of the salt marsh and subsequently impact that sensitive wetland/upland interface.

Prime Wetland Buffer Enhancement Program Planting Area

The PWBEP plantings will occur in areas in which removal activities result in bare areas exceeding 10 (SF). In using this approach, GLW will maintain compliance with the above-mentioned regulations. The resident bird species will

benefit from the provision of food from fruit-bearing shrubs as well as nesting and cover habitat with these existing and proposed plants. Table 1. describes the function and values attributes of the selected shrubs. In addition to providing nesting, and cover opportunities, these species will produce showy inflorescences and fruiting bodies during a variety of seasons. Planting activities will be undertaken with caution with only the minimal soil agitation required to properly plant the shrubs. Herbivore exclusion fencing should be utilized during initial the initial years so plants can become well-established in the root network without the disturbance associated with deer browsing. The PWBEP includes these high value shrubs which are tolerant of coastal conditions, coupled with a vegetation management maintenance regime that would prevent the future proliferation of invasive species, and maintain a desirable woody vegetation understory that will facilitate the re-establishment of the original viewscape, and allow for the aesthetic enjoyment of the Sagamore Creek tidal salt marsh ecosystem from the wetland buffer (PWB) by the occupants of GLW .

Table 1. Prime Wetland Buffer Enhancement Program Planting Schedule

Shrub Species	Spacing Specifications	Aesthetic & Wildlife Function & Value
Serviceberry (*Amelanchier canadensis*)	Three to four-foot specimens, planted in areas exceeding 10 SF following invasive vegetation removal	Attractive early flowering large shrub with excellent value as summer food and cover for bluebird, cardinal, cedar waxwing, catbird, red squirrel, scarlet tanager, veery, and deer.
Northern Bayberry (*Myrica pensylvanica*)	Three to four-foot specimens, planted in areas exceeding 10 SF following invasive vegetation removal	Excellent food source for migrating birds; Salt tolerant foliage and aromatic fruit; effective for coastal stabilization and are salt-tolerant.
Beach Plum (*Prunus maritima*)	Three to four-foot specimens, planted in areas exceeding 10 SF following invasive vegetation removal	Aesthetically pleasing white showy inflorescence; dense thickets provide cover habitat and summer food sources for birds and small mammals; also effective for coastal stabilization and are salt-tolerant.

Nest Box Installation

Pole or sapling-mounted nest boxes will be strategically placed adjacent to available food and cover or other micro-habitat features with the intent that they are utilized by numerous avian and mammalian species. Most cavity nesting bird species will readily use nest boxes as well. Nest boxes also provide excellent recreational wildlife viewing opportunities. Species of focus for nest boxes include white-breasted nuthatch (*Sitta carolinensis*), chickadee (*Poecille atricaopillus*), hairy woodpecker (*Picoides villosus*), downy woodpecker (*Picoides pubescens*), northern flicker (*Colaptes auratus*), eastern phoebe (*Sayornis phoebe*), kingbird (*Tyrannus tyrannus*), willow flycatcher (*Empidonax trailii*), white-throated sparrow (*Zonotrichia albicollis*), house wren (*Troglodytes aedon*), and warblers such as yellow warbler (*Setophaga petechia*), and common yellowthroat (*Geothlypis trichas*). Gray squirrel (*Sciurus caroliniensis*) red squirrel (*Sciurus vulgaris*), and eastern chipmunks will also utilize nest boxes for nesting and the storing of food caches. Suggestions for locations for up to six nest boxes will be made at the time of installation; however, generally located evenly throughout the woody component of the PWBEP areas associated with each building cluster. Nest boxes can be sourced locally or built by a local Girl or Boys Scout troops. Refer to Figure 2. Nest Box Schematics for reference and construction specifications.

Maintenance Regime and Procedures

- On an annual basis, conduct an inventory of new native recruits and seedlings that have germinated from onsite seedbank;
- On an annual basis, inspect and demarcate, with red and white flagging, any woody invasive species shoots for removal with hand tools by the vegetation maintenance contractor;
- On an annual basis, inspect and tabulate the survivability of the planted PWBEP shrubs;
- Provide GLW and the vegetation maintenance contractor with a packet of ID field sheets for the existing target invasive species;
- Photograph and document the condition of the wetland buffer (PWB) and submit a report to GLW to share with the vegetation maintenance contractor prior to each annual maintenance event; and,
- If necessary, the wetland specialist can be present onsite during initial maintenance activities to ensure proper implementation of invasive species removal activities, assist vegetation maintenance crews to ensure that native plants remain.

In summary, it is expected, throughout each year of maintenance activities, that the existing oaks and other native species seed sources behind Buildings 1 through 3, as well as future maintenance of invasive vegetation behind Buildings 4 through 5, and Buildings 6 through 7, will allocate similar resources and facilitate the proliferation of these native species in the 100-foot wetland buffer (PWB). These species should thrive and grow to shrub and sapling sized plants and ultimately revegetate the buffer while succession will be naturally attenuated by native species and the viewscape will be preserved. The PWBEP plantings will complement the species diversity while resident species will continue to utilize the wetland buffer (PWB). In fact, it is anticipated that the nesting boxes will increase the potential to provide more wildlife habitat diversity and increase species composition in the wetland buffer, thereby improving the food chain dynamic and variation with Lepidopteran invertebrates, mammals, and bird species. In addition, the PWBEP will provide a logistical and efficient manner for which GLW can maintain this valuable property and valuable wetland buffer (PWB) of the Sagamore Creek tidal salt marsh while realizing property goals, tenant comfort, and tenant safety.

The primary goal of dissuading the trespassing by homeless individuals and outdoor parties will be achieved by the secondary goal of the invasive vegetation maintenance component of the PWBEP, which in turn, will achieve the third goal of enhancing the ecological value of the wetland buffer (PWB) through attracting new wildlife and invertebrate species recruits and improving the food chain dynamic in this area of suburban Portsmouth.

Respectfully Submitted,

Mission Wetland & Ecological Services, LLC.

Sergio Bonilla, PWS, CWS, CESSWI
Principal Wetland Ecologist

Cc: Sam Raynor, CP Management
Peyton McManus, Board of Directors, Greenleaf Woods Condo Association
Tim Myles, Board of Directors, Greenleaf Woods Condo Association
Beth Moreau, Board of Directors, Greenleaf Woods Condo Association

Attachments: Photographic Log
Figure 1. Prime Wetland Map of Greenleaf Woods
Figure 2. Nest Box Schematics

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PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
CP Management	Greenleaf Woods Drive (Tax Map 243, Lot 6) Portsmouth, New Hampshire	20-024

Photo No.	**Date:**
1	9/18/20

Description:

Facing southeast behind buildings 4 and 5 at multiflora rose (*Rosa multiflora*), common buckthorn (*Rhamnus cathartica*), and glossy buckthorn (*Frangula alnus*) outcompeting staghorn sumac (*Rhus typhina*) and strangling white pines (*Pinus strobus*) in the 100-foot buffer (PWB).

Photo No.	**Date:**
2	9/18/20

Description:

Facing west at the dense community of invasive multiflora rose behind buildings 6 and 7. This community is the dominant invasive species in the 100-foot wetland buffer (PWB).

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PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
CP Management	Greenleaf Woods Drive (Tax Map 243, Lot 6) Portsmouth, New Hampshire	20-024

Photo No.	**Date:**
3	9/18/20

Description:

Facing south at asiatic bittersweet (*Celastrus orbiculatus*) strangling white pines and outcompeting native maple-leaved viburnum (*Viburnum acerifolium*) shrubs and white ash (*Fraxinus americana*) saplings.

Photo No.	**Date:**
4	9/18/20

Description:

Facing northeast from the salt marsh (PW#62) at the upland boundary and autumn olive (*Elaeagnus umbellata*) outcompeting crab apple trees (Malus spp.) and trembling aspen (*Populus tremula*).

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PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
CP Management	Greenleaf Woods Drive (Tax Map 243, Lot 6) Portsmouth, New Hampshire	20-024

Photo No.	**Date:**
5	9/18/20

Description:

Facing south at the wetland buffer behind buildings 1- 3 and the regeneration of primarily oak seedlings of several species that will continue to proliferate in the wetland buffer with allocation of resources to the buffer facilitated by the removal of the invasive vegetation that choked out native herbaceous and woody vegetation. Note the restored view scape of the salt marsh.

Photo No.	**Date:**
6	9/18/20

Description:

With the appropriate management regime, tenants of the GLW commercial facility will continue to enjoy the picturesque view scape of the Sagamore Creek tidal salt marsh (PW #62) throughout the years. Note the restoration of the view scape of the black grass (*Juncus gerardii*), salt-hay (*Spartina patens*), salt grass (*Distichlis spicata*), and glasswort (*Salicornia europea*) salt marsh vegetation communities of the salt marsh (PW #62).

Figure 1. Prime Wetland Buffer Map - Greenleaf Woods, Portsmouth, NH

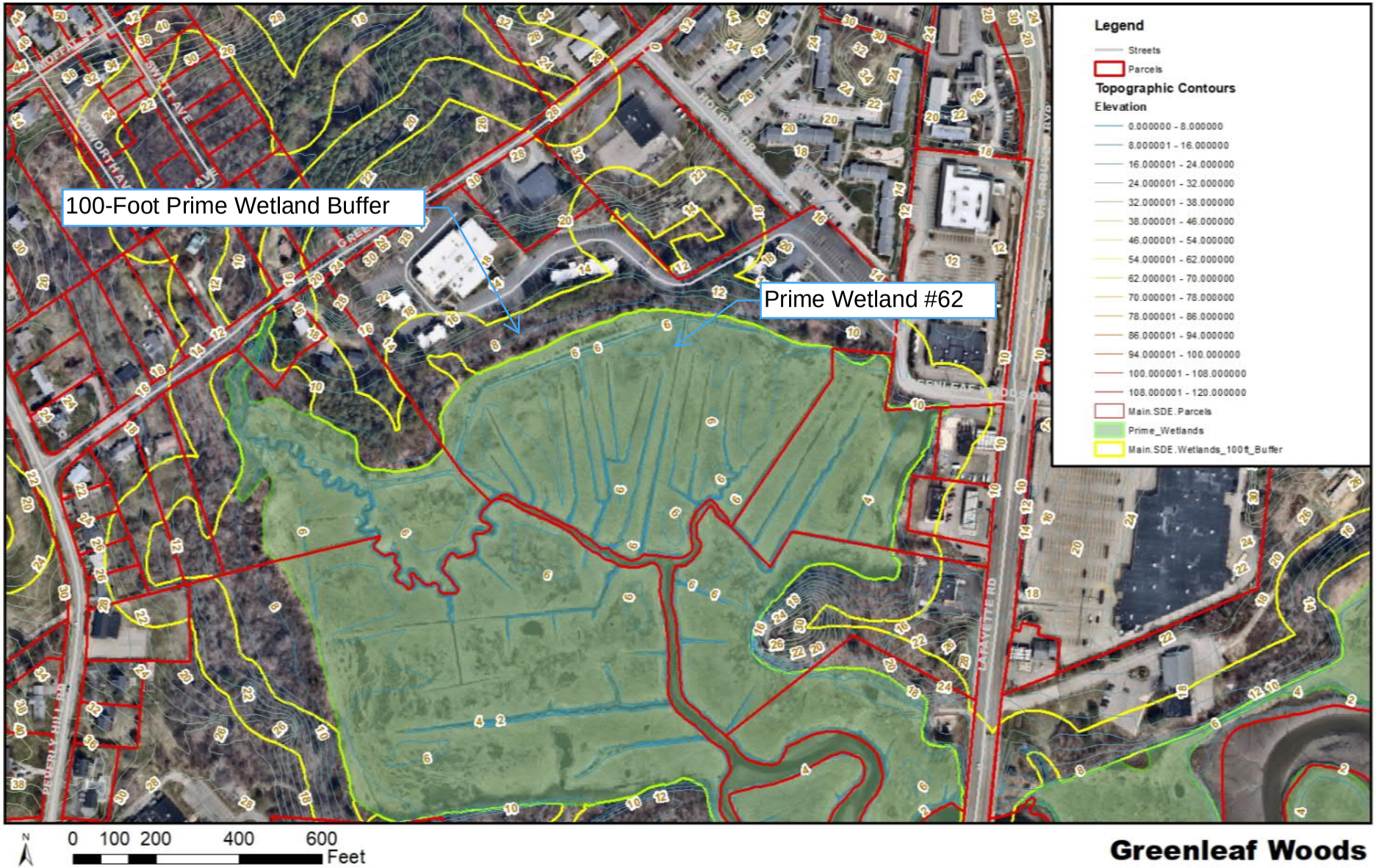
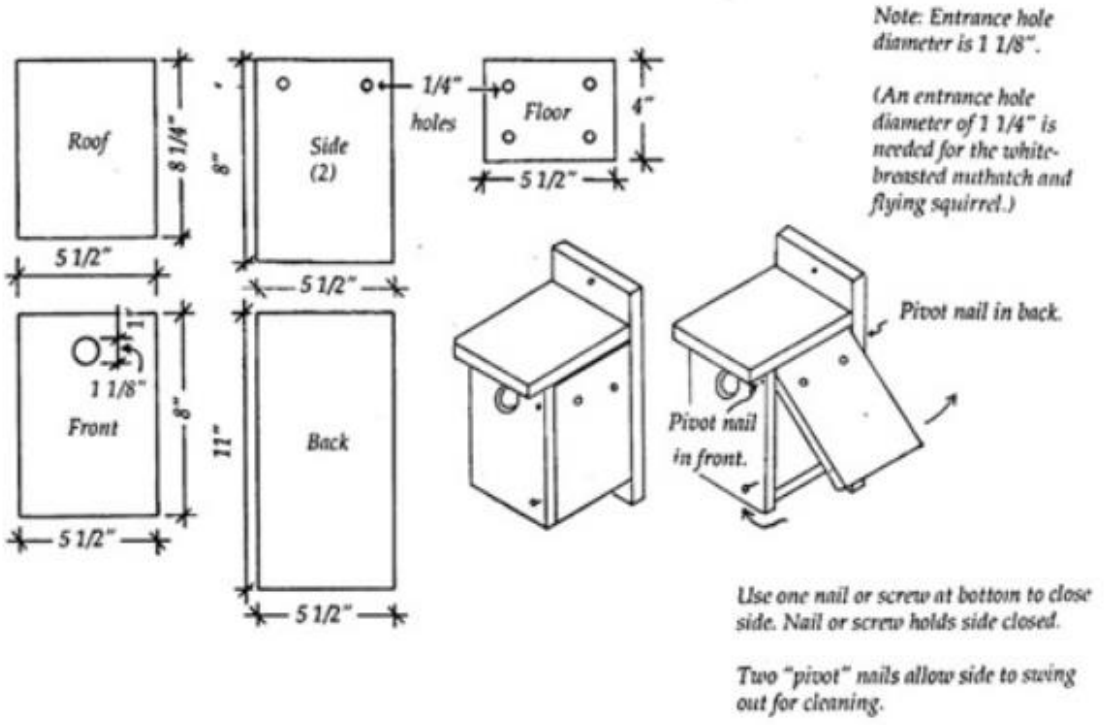


Figure 2. Nest Box Schematics



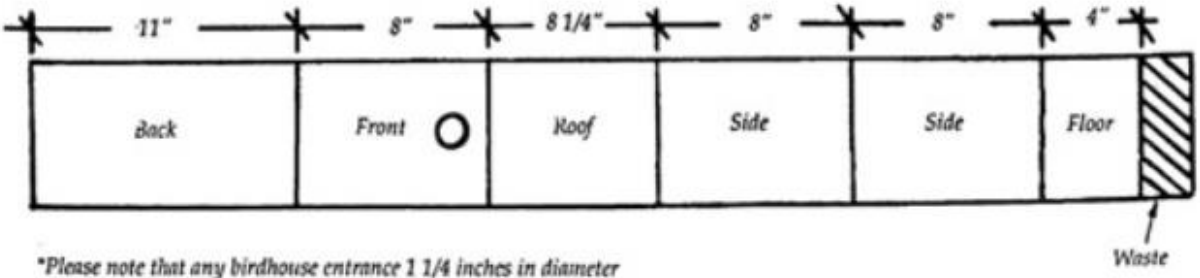
Note: Entrance hole diameter is 1 1/8".

(An entrance hole diameter of 1 1/4" is needed for the white-breasted nuthatch and flying squirrel.)

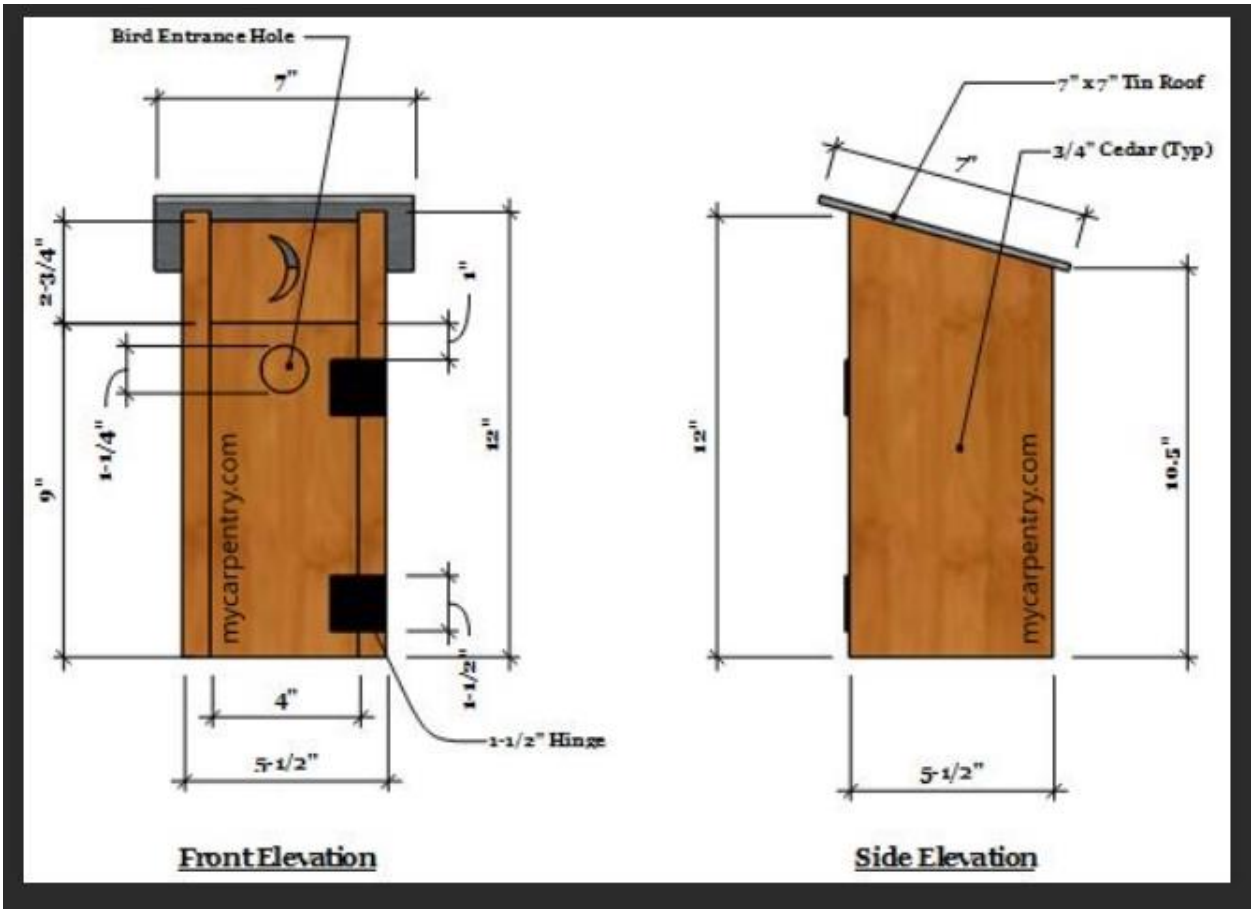
Use one nail or screw at bottom to close side. Nail or screw holds side closed.

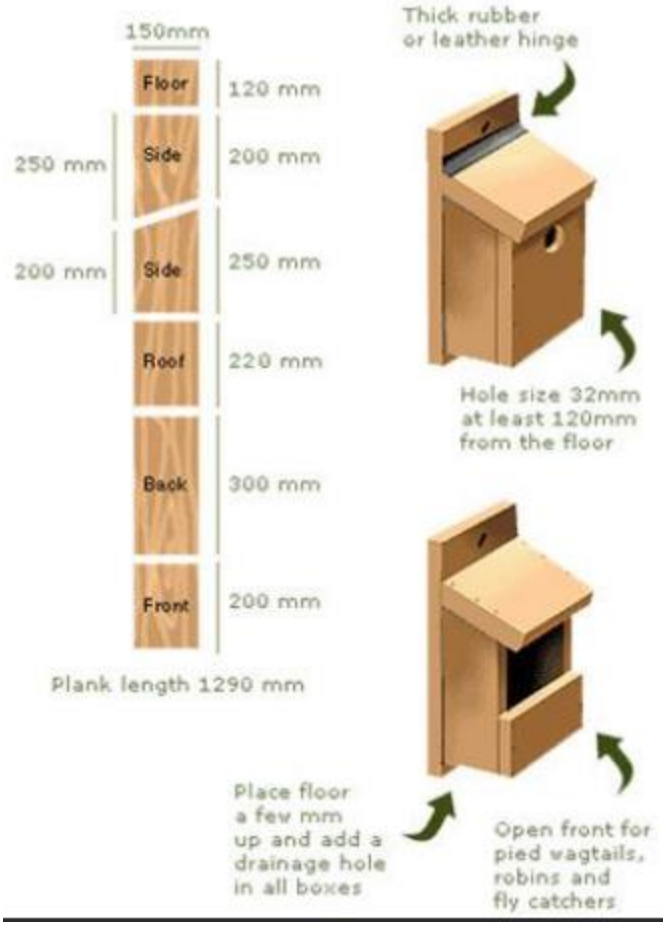
Two "pivot" nails allow side to swing out for cleaning.

Lumber: One 1" x 6" x 4'0".



**Please note that any birdhouse entrance 1 1/4 inches in diameter or larger will admit house sparrows! All wren and chickadee nest boxes should have an entrance hole of 1 1/8 inches in diameter.*


Bird Entrance Hole
7"
2-3/4"
1"
1-1/4"
9"
12"
mycarpentry.com
1-1/2"
4"
5-1/2"
1-1/2" Hinge
Front Elevation
7" x 7" Tin Roof
7"
3/4" Cedar (Typ)
12"
10.5"
mycarpentry.com
5-1/2"
Side Elevation


150mm
Floor
120 mm
250 mm
Side
200 mm
200 mm
Side
250 mm
Roof
220 mm
Back
300 mm
Front
200 mm
Plank length 1290 mm
Thick rubber
or leather hinge
Hole size 32mm
at least 120mm
from the floor
Place floor
a few mm
up and add a
drainage hole
in all boxes
Open front for
pied wagtails,
robins and
fly catchers