CHAPTER 4 –RECOMMENDED FACILITIES ANALYSIS

4.1 INTRODUCTION

This chapter presents the infrastructure improvements that would allow Parlin Field to:

(1) Correct or mitigate airport design standard deficiencies;
(2) Develop facilities to meet existing and forecast levels of demand;
(3) Achieve the goals and objectives identified by the Airport Advisory Board.

The issues and justification associated with each proposed airport improvement project are presented below.

4.2 AIRPORT DESIGN STANDARD DEFICIENCIES

At the outset of this master plan, an inventory was taken of existing conditions at Parlin Field. Within that inventory the ability of the current airport infrastructure to meet Federal and State airport design standards was assessed. It should be noted once again that as Parlin Field does not receive federal grant assistance, it is not obligated to meet the federal airport design standards contained in FAA Advisory Circular 150/5300-13. However, Parlin Field is committed to meeting those standards where feasible and, as the airport is licensed by the State of NH, many of the same design criteria apply for the airport to receive certification by the NH Bureau of Aeronautics.

The FAA defines certain rectangular and trapezoidal areas centered about runways as Runway Safety Areas (RSA), Object Free Areas (OFA) and Runway Protection Zones (RPZ) which serve to provide clear areas in the event an aircraft exits the runway unintentionally. These areas are depicted on the Airport Layout Plan (ALP) set in Chapter 6 and various figures for each are included in the sections below. It is suggested that the airport control the area within RPZ and keep it clear of objects. As with the RPZ, the RSA and OFA need to be maintained free of objects while the RSA has the added stipulation to meet certain grading criteria which are shown below as noted in FAA AC 150/5300-13:

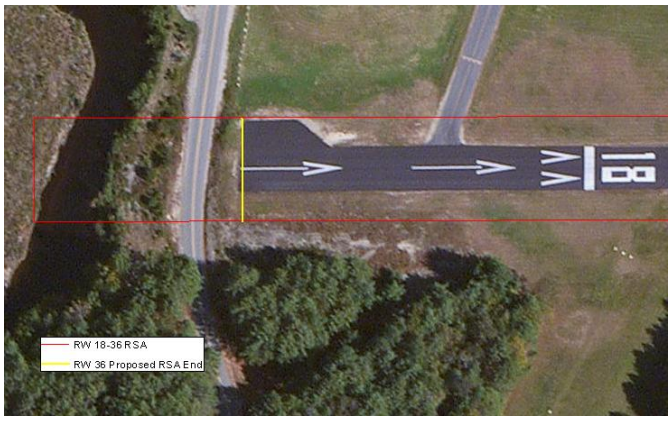
> **(1) Longitudinal grades, longitudinal grade changes, vertical curves, and distance between changes in grades for that part of the runway safety area between the runway ends are the same as the comparable standards for the runway and stopway. Exceptions are allowed when necessary because of taxiways or other runways within the area. In such cases, modify the longitudinal grades of the runway safety area by the use of smooth curves. For the first 200 feet (60 m) of the runway safety area beyond the runway ends, the longitudinal grade is between 0 and 3 percent, with any slope being downward from the ends. For the remainder of the safety area (figure 5-5), the maximum longitudinal grade is such that no part of the runway safety area penetrates the approach surface or clearway plane. The maximum allowable negative grade is 5 percent. Limitations on longitudinal grade changes are plus or minus 2 percent per 100 feet (30 m). Use parabolic vertical curves where practical.**

Due to a lack of surveyed topographic data for the airport, only a best guess estimate is provided when determining compliance with grading criteria. Each of these surfaces and deficiencies as related to Parlin Field are discussed below.

4.2.1 Runway Safety Areas

The Runway Safety Area (RSA) dimensions for Runway 18-36 and Runway 12-30 are 120-feet wide and extend a distance of 240-feet beyond each runway end as shown on the Airport Layout Plan (ALP) drawings in Chapter 6. As stated in the FAA Advisory Circular, the RSA's for each runway should be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations (grading criteria are noted above in Section 4.2). The Town of Newport has cleared to the extent practicable all objects within the extents of the RSA for Runway 18-36 and Runway 12. The challenges associated with meeting RSA design criteria are discussed below.

Runway 18-36



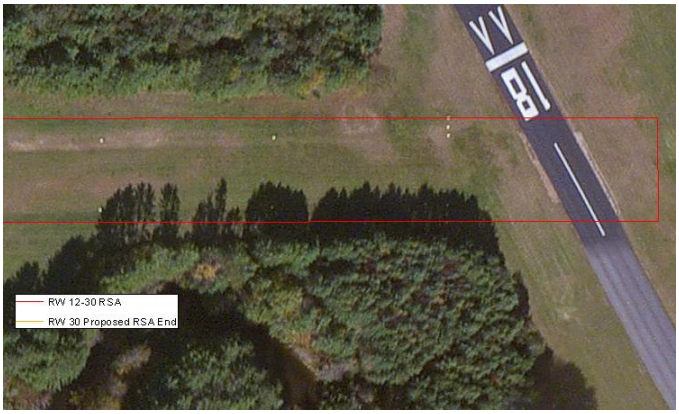
The 240-feet of RSA at the departure end of Runway 36 slopes downward steeply for a distance of 40' from the runway end before crossing Corbin Road and the Sugar River. It does not meet grading criteria. It would not be practicable to provide a full RSA at the departure end of Runway 36 as it would require the relocation of Corbin Road and a section of the Sugar River and extensive fill to meet grading criteria. Due to the type and volume of traffic utilizing the airport now and in the future, an equivalent level of safety can be achieved by declaring a landing distance for Runway 36 of 2,908-feet and utilizing the remaining 240' of pavement as RSA. The lateral extents of the RSA are largely free of obstructions and the grading alongside the length of the majority of the runway (between the runway ends) appears to meet the standard.

The 240-feet of RSA at the departure end of Runway 18 extend approximately 85-feet before intersecting with the Sugar River. As with the RSA at the departure end of Runway 36, the cost and environmental permitting associated with bringing this RSA into full compliance would be prohibitive. By keeping the Runway 36 threshold at its current location (displaced 300' from end of pavement) the airport could declare a landing distance of 2,750-feet on Runway 18 and comply with the 240-foot RSA length beyond runway end.

Runway 12-30

A portion of the RSA at the departure end of Runway 30 extends into the Sugar River and multiple trees are within the last 180-feet (beginning 40-feet from the Runway 12 threshold) and therefore, the RSA does not meet the criteria to maintain the area clear of objects. Because the trees within this RSA are within the Corbin Bridge Park and removing them would alter the character of the airport, it is not expected that the Town or Airport will be able to easily remove the trees. Therefore, it is recommended to declare a landing distance of 1,770-feet on Runway 30 to provide a full RSA.

The RSA at the departure end of Runway 12 crosses Runway 18-36 and appears to meet the RSA criteria for clearing and grading. No recommendations are offered for the existing Runway 12 RSA as the length beyond runway end appears adequate to meet current design criteria.



Figures 4-1 and 4-2 on the following page illustrate the option of providing declared distances for each runway end on Runway 18-36. The terms associated with the use of declared distances are:

TORA *(Takeoff Run Available)* – The runway length declared available and suitable for the ground run of an airplane taking off;

TODA *(Takeoff distance available)* – The TORA plus the length of any remaining runway or clearway (CWY) beyond the far end of the TORA;

ASDA *(Accelerate-stop distance available)* – The runway plus stopway (SWY) length declared available and suitable for the acceleration and deceleration of an airplane aborting a takeoff; and

LDA *(Landing distance available)* – The runway length declared available and suitable for a landing airplane.

Figure 4-1 Runway 18 Declared Distance Option

Runway 18 is 3,448 feet:

Runway 18 has a displaced threshold of 398 feet. The departure end of the runway is used to gain a 240 foot safety area needed to complete the 240 foot required RSA for this runway. The last 60 feet of runway is unusable for RSA due to grading along the west side.

TORA 3,448 TODA 3,448 ASDA 3,148 (3,448-240-60) LDA 2,750 (3448-398-240-60)

Figure 4-2 Runway 36 Declared Distance Option

Runway 18-36 is 3,448 feet:

Runway 36 has a displaced threshold of 300 feet. The departure end of the runway is used to gain a 240 foot safety area needed to complete the 240 foot required RSA for this runway.

TORA 3,448 TODA 3,448 ASDA 3,208 (3,448-240) LDA 2,908 (3448-300-240)

4.2.2 Runway Object Free Areas

The Runway Object Free Area (OFA) dimensions for Runway 18-36 and Runway 12-30 are 250-feet wide and extend 240-feet beyond each runway end as shown on the figures below as well as on the Airport Layout Plan (ALP) drawings in Chapter 6. As stated in the FAA Advisory Circular, the OFA's should be clear of above ground objects protruding above the runway safety area edge elevation. Except where precluded by other clearing standards, it is acceptable to place objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes and to taxi and hold aircraft in the OFA. Objects non-essential for air navigation or aircraft ground maneuvering purposes are not to be placed in the OFA. This includes parked airplanes.

Runway 18-36

The OFA for Runway 18-36 extends off of airport property. The northern portion extends across Corbin Road and the Sugar River as shown on Figure 4-3 below. There are multiple trees on the north side of Corbin Road that are within the OFA. A small stand of trees at the south end of the runway, and just west of the runway are also in the OFA. Trees at both ends should be removed from the OFA. As with the RSA's, the OFA length beyond runway end may be reduced with the application of declared distances.

Figure 4-3 Runway 18-36 Object Free Area

Runway 12-30

Part of the OFA at the departure end of Runway 30 extends beyond airport property and into the Sugar River. The Corbin Bridge Park lies within the last 180-feet of the OFA at the departure end of Runway 30. As shown in Figure 4-4 below, several areas of vegetation lie within the extent of the Runway 12-30 OFA and should be trimmed back to provide a clear OFA. The OFA length beyond runway at the approach end of Runway 12 may be reduced with the application of declared distance for landing length thereby eliminating the need to remove the trees within the Corbin Bridge Park.

Figure 4-4 Runway 12-30 Object Free Area

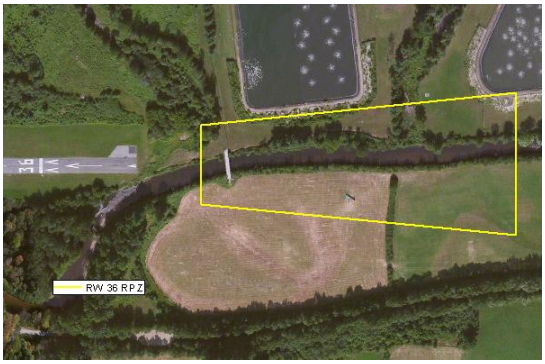
4.2.3 Runway Protection Zones

As noted in FAA AC 150/5300-13, the RPZ's function is to enhance the protection of people and property on the ground. This is achieved through airport owner control over RPZs. Such control includes clearing RPZ areas (and maintaining them clear) of incompatible objects and activities. Control is preferably exercised through the acquisition of sufficient property interest in the RPZ. The RPZ dimensional standards are based on the type of approach to the runway. All runways at Parlin are considered visual runways (small aircraft exclusively); however the RPZ at the approach end of Runway 36 is based on a future non-precision approach with visibility not lower than 1 mile which has the same dimensions as the other RPZ's. All RPZ's begin 200-feet beyond the usable area for takeoff or landing. The RPZ's for each runway end are discussed below.

Runway 18

The Runway 18 RPZ encompasses 8 acres, most of which is on private property (parcel ID 212-016-000). The land under the RPZ has been cleared of vegetative obstructions down to the terrain. The Town of Newport owns an avigation easement over the entire RPZ area which allows for the clearing of vegetation that penetrates a 20:1 avigation easement slope. Due to the presence of the avigation easement it is not recommended that the Town pursue ownership of the property within the Runway 18 RPZ as the existing easement provides adequate protection of the overlying airspace for the inner portion of the approach.

Runway 36



The Runway 36 RPZ extends off airport property and spans over property owned by the Town of Newport. The current land use within this 8 acre area is mixed between farmland and waste water treatment lagoons. The Town has adopted zoning

ordinances (see **Appendix D**) allowing for the control of vegetation and limiting the height of man-made structures to below a 40:1 approach surface as specified in the Town's zoning ordinance. The zoning ordinance should be sufficient to control land use within the Runway 36 RPZ so long as the Town of Newport maintains control of the property.

Runway 12

The Runway 12 RPZ is almost entirely off airport property. It encompasses a section of the Sugar River and private property (parcel ID 219-038-000 and 219-039-000). The land within the RPZ is primarily wooded and wetland. Due to the nature of the existing vegetation and limited development potential as well as the presence of the Corbin Bridge Park, the Town's zoning ordinance should provide adequate protection of the land within the Runway 12 RPZ. The Town may consider purchasing the property within the RPZ to ensure compatible use of the property however this should be a low priority for the Town given the nature of the current land use.

Runway 30

Approximately half of the Runway 30 RPZ lies on airport property with the remainder on private property (parcel ID 218-005-000). Of all the parcels within each of the RPZ's, the land within the Runway 30 RPZ has the greatest potential for development. The Town of Newport should acquire the remainder of the privately owned property within the RPZ if able, to ensure compatible airport development.

4.2.4 FAR Part 77 Airspace

To be completed once obstruction mapping is obtained (Summer 2012).

4.3 DEMAND / CAPACITY DRIVEN RECOMMENDATIONS

Chapter 3 – Demand / Capacity provided an analysis of Parlin Field's infrastructure to accommodate existing and forecast levels of demand. Several recommendations resulted from that analysis:

(1) Provide a partial parallel taxiway;
(2) Increase available area for transient aircraft parking;
(3) Provide additional aircraft storage hangar options.

The following sections provide a discussion on alternatives to satisfy the recommendations noted above.

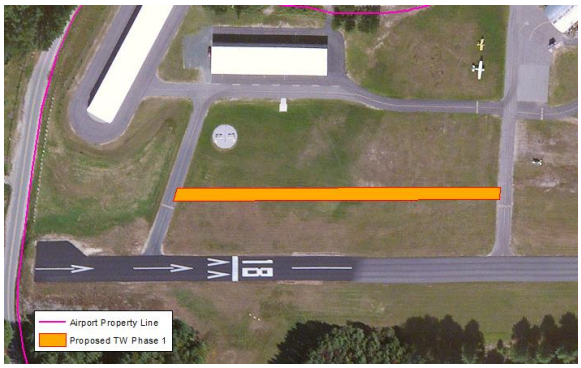
4.3.1 Provide a Partial Parallel Taxiway

The recommendation for a parallel taxiway stems from a desire to enhance safety and increase operational capacity to meet demand. With the addition of a parallel taxiway, the current practice of back taxiing to depart Runway 36 or to access the terminal area when landing Runway 18 would be eliminated. Current back taxi operations are estimated at 3 minutes each which limits operations to 20 aircraft per hour. Parlin typically experiences an average of 30 or more operations on a good weather weekend and without an adequate taxiway system, numerous delays and congestion occur on the limited taxiways, runway and ramp areas.

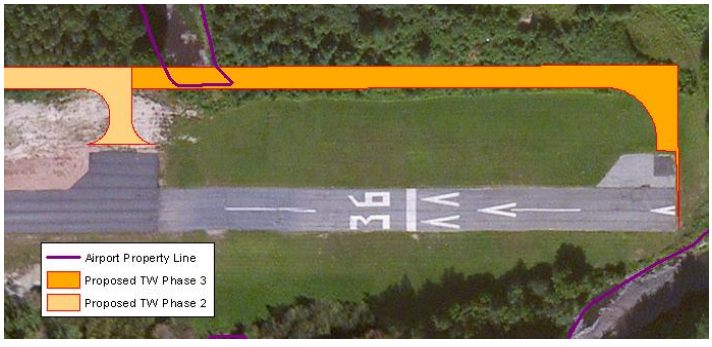
Providing a parallel taxiway would decrease runway occupancy time and reduce the potential for two aircraft attempting to occupy the runway simultaneously. The layout of a parallel taxiway is depicted in Chapter 6 – Airport Layout Plan on Drawing 3. The vision is to construct the taxiway in three separate phases while meeting the runway/taxiway separation criteria outlined in FAA Advisory Circular 150/5300-13.

The first of three phases constructs a parallel taxiway from the midfield taxiway approximately 1,870-feet south to connect with an existing turn around area. By extending the taxiway to this point, aircraft would avoid the need to back taxi along the majority of the runway when departing Runway 36. Extending the parallel taxiway further south beyond this point would require extensive environmental permitting and earthwork. If warranted, this would be accomplished as Phase 3.

Phase 2 adds a 25-foot wide parallel taxiway that would extend from the stub connector which connects Runway 18-36 to the aircraft storage hangars approximately 655-feet to the existing midfield taxiway that provides access from Runway 18-36 to the terminal area. This phase would allow aircraft taxiing from the terminal area to Runway 18 to bypass the aircraft storage hangar taxilanes. Bypassing the aircraft hangar aprons alleviates congestion and delay in these areas.



Phase 3 extends the parallel taxiway 640-feet to the end of Runway 36. The taxiway would impact a culvert which runs underneath Runway 18-36. Due to the presumed presence of wetlands, extensive environmental permitting and coordination will need to take



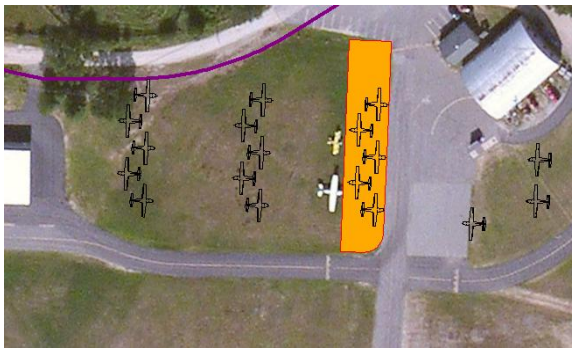
place prior to construction of this phase of taxiway improvement. The high cost of design, permitting, and construction would make this phase of the parallel taxiway a long-term, low priority project for the airport.

4.3.2 Transient Aircraft Parking

Based on the calculations from Chapter 3 – Demand / Capacity, Parlin Field can reasonably expect to see 30 aircraft operations during peak periods on good weather summer days and in excess of that during certain airport events. The operational split between transient and based aircraft has proven to be approximately 55% transient and 45% based. This split yields 17 transient aircraft seeking temporary parking during the peak hour period. The remaining 13 peak hour operations are presumed to be conducted by based aircraft which are stored in aircraft storage hangars at Parlin Field.

Currently the airport can accommodate 6 aircraft on turf tie-downs and 2 aircraft on paved tie-downs. However several of the turf tie-downs are occupied during the summer months by seasonal aircraft and one of the paved tie-downs is not used as it was placed too close to the taxiway leaving only 5 aircraft tie-downs available for transient parking. The current parking configuration leads to congestion on the paved apron as the aircraft parking spots are in close proximity to the airport fuel farm. This limits the maneuverability of aircraft.

An analysis of existing turf and paved areas suitable for temporary or short-term transient aircraft tie-down spots was conducted to identify additional areas to accommodate a minimum of 12 transient aircraft based on meeting peak hour demand (assumes 5 transient aircraft can be accommodated on existing tie-down spots). Providing the FAA suggested 3,240 sq. ft of apron parking per transient aircraft would yield a need for 38,880 sq. ft. of transient aircraft parking space over the 20-year forecast period.



The turf area between the terminal apron (where the existing aircraft tie-downs are) and Hangar C yields approximately 60,000 sq. ft. that could be used for aircraft tie-downs. A conceptual plan (shown here) depicts a layout that provides 12 additional aircraft tie-down spots if configured as shown. The orange shaded area represents approximately 9,100 sq. ft. of pavement that would be added to the existing terminal apron. This configuration would allow Parlin Field to meet a peak hour demand based on the assumptions noted above. The additional pavement would improve transient aircraft parking during the winter months as snow could be pushed further back, allowing more room for the parking of aircraft without interfering with aircraft fueling operations.

4.3.3 Aircraft Storage Hangars

All but one of Parlin Field's 35 based aircraft are stored in hangars. The forecast of based aircraft suggests an additional 5 based aircraft at Parlin Field over the 20-year planning period. It is expected that any additional based aircraft owners would prefer to store their aircraft in a hangar. Airport management has stated that there is currently a waiting list for space in the Community Hangar and all other hangar space in the remaining hangars has been rented.

Over the last several years Parlin Field has experienced significant development and has reached a near build-out scenario. Sensible, buildable lot space to support additional aircraft hangars is no longer available without acquiring property adjacent to the airport. Without property acquisition, Parlin Field will be limited to the capacity of the current aircraft hangar storage.

The Town of Newport should consider the possibility of acquiring adjacent property to accommodate at least one 60' x 80' hangar (similar size to the existing Community Hangar) and one 6-10 bay T-hangar.

4.4 ADDITIONAL FACILITY REQUIREMENTS

Separate from meeting airport design standards and developing facilities to meet demand, Parlin Field could benefit from several additional improvements not identified through previous analysis methods. At the outset of this master plan, comments were solicited from the users and tenants at Parlin Field (see **Appendix E**) which they thought would enhance Parlin Field. These improvements would serve to enhance safety and provide better access to the airport. The improvements are in the form of a non-precision satellite based GPS instrument approach procedure as well as a Visual Glide Slope Indicator (VGSI), drainage / erosion control and equipment storage shed. Each of these improvements is discussed below.

4.4.1 Instrument Approach Procedure

As a gateway to the Lake Sunapee region, Parlin Field serves a key role in the State airport system as an aviation facility for public and emergency services. Safe and efficient access to the airport in all weather adds to the vitality of Parlin field and the surrounding community in the form of increased business and personal flight operations as well as access for emergency medical flights during periods of poor weather.

A satellite based non-precision instrument approach procedure (IAP) such as a GPS approach to Runway 36 would provide such access to Parlin in poor weather that is not currently available. There are several types of GPS based approaches that are being programmed at airports throughout the United States and the world. The different GPS approaches are LPV (Localizer Performance with Vertical Guidance) which is the most precise; LNAV/VNAV (Lateral Navigation/Vertical Navigation); LP (Localizer Performance) and LNAV (Lateral Navigation only). One of the key benefits of these approaches is that no ground based navigation equipment is required, and therefore no equipment or critical area to maintain. The only requirement of the airport sponsor to obtain and keep a GPS type approach is to maintain the approaches clear of vegetative and man-made obstructions.

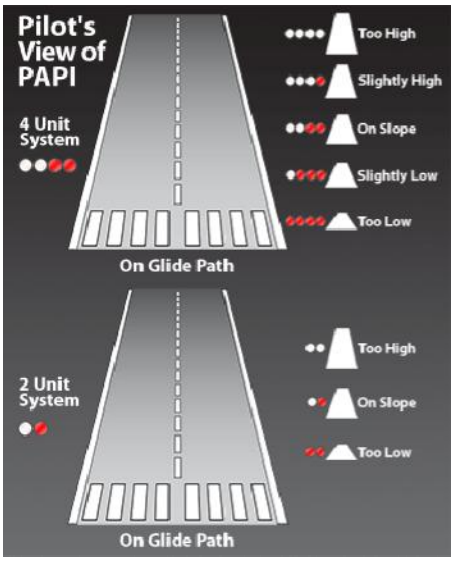
Parlin Field has submitted to the FAA Flight Procedures office the required paperwork to apply for a non-precision IAP to Runway 36. Initial discussions with Flight Procedures indicate that Parlin Field is a good candidate for an LNAV type GPS approach. In addition to FAA Form 7480-1 (which has been submitted to FAA Flight Procedures), Parlin Field will be obtaining obstruction mapping during the summer of 2012 to conduct an obstruction analysis of several

FAR Part 77 and TERPS (United States Standard for Terminal Instrument Procedures) surfaces to provide Flight Procedures with an update to their obstruction database in hopes of aiding the development of an LNAV IAP for Runway 36 with the lowest possible cloud ceiling and visibility minimums.

4.4.2 Visual Glide Slope Indicator (VGSI)

A VGSI provides a visual cue to the pilot of a landing aircraft to aid in determining whether the aircraft position is high or low in relation to an optimal fixed descent angle (generally 3-degrees) to provide a stabilized approach to landing which is clear of obstacles. This greatly enhances operational safety at the airport, especially for landing operations at night. There are two types of VGSI systems available – PAPI (Precision Approach Path Indicator) or VASI (Visual Approach System Indicator).

Another benefit the use of a VGSI provides is that it can be used as a mitigation option where obstacles have been identified to certain protected airspace surfaces where those obstacles cannot be removed or lit.



The local FAA Facilities and Equipment office as well as the FAA's National Program Office (responsible for coordinating the release of FAA Facilities) in Washington, D.C. was contacted to determine Parlin Field's eligibility to acquire surplus VASI or PAPI equipment. Discussions with staff at the NH Bureau of Aeronautics were also held. As of this writing, the NH Bureau of Aeronautics has stated that a VASI is being replaced at Boire Field in Nashua, NH and may be available to Parlin Field. The power requirements will need to be determined to ensure compatibility with the power system at Parlin. If it is determined that the VASI from Boire Field exceeds the power available at Parlin, then options for an LED type PAPI will be explored.

4.4.3 Airport Drainage and Erosion Control

As noted in Chapter 1 – Inventory, significant erosion of the river bank at the approach end of Runway 36 has taken place over the years. The Sugar River winds around near the end of the runway and cuts into the bank. Airport management estimates that the bank is eroding at approximately one foot per year. Measures need to be considered and taken in the very near future to stabilize the bank to prevent further erosion and the ultimate loss of runway pavement.

In 2007, airport management sought advice from an engineering firm as to best practices and potential mitigation options as well as costs to address the erosion of the river bank. The engineering firm provided a very rough estimate for approximately 300 linear feet of riverbank stabilization at 8-feet high using soil bioengineering. It was also suggested to rehabilitate an existing drainage swale (300-feet long by 10-feet wide by 1-foot deep).

The scope of work to complete the soil stabilization and drainage swale project included:

Engineering and Permitting Elements

- Wetlands mapping within the project area;
- Obtain topographical survey;
- Obtain subsurface soils information;
- Determine species of trees 100-feet on either side of the project limits in accordance with the Comprehensive Shoreland Protection Act, RSA 483-B;
- Prepare design plans, cross-sections and project specifications of the riverbank stabilization using soil bioengineering techniques;
- Prepare design plans, cross-sections and project specifications of the swale rehabilitation using geotextile stabilization fabric and stone lining;
- Prepare permit applications to be submitted to the New Hampshire Department of Environmental Services (NHDES). Wetlands, RA 482-A and Non-Site Specific, RSA 485-A; 17;
- Attend NHDES public hearings for permit approvals;
- Prepare final bid documents for public bidding.

Construction Elements

- Excavation
- Embankment material for refill
- Stone fill rip-rap (D 50)
- Gravel bedding
- Re-handled topsoil
- "Eco-Logs"
- "Gabions"
- "Reno Mattress"
- "Coconut Fibro Blankets"
- Stone fill for Gabions, Reno Mattress, and Enviro-Logs
- Geotextile Fabric
- Live Willow Stakes (salix and cornus)
- Brush Mattress (salix and cornus mix)
- Lower slope plants (salix and cornus)
- Erosion control seed mix

For planning purposes, the NH Bureau of Aeronautics has estimated costs for the erosion control project and broken it into two phases which would take place over several years. Phase I would address erosion control mitigation and permitting and is expected to be funded over two years at a cost of $150,000. Phase II entails the construction portion of the project and carries an estimated cost of $100,000. Typical cross-sections of Eco-Log and Green Gabion installations along with photos of the river bank are included in **Appendix F**.

4.4.4 Equipment Storage Facility

The airport manager and tenants have expressed the need for a building to store airport maintenance equipment such as mowers, gasoline and diesel cans, weed whacker, tools, Bobcat loader and accessories, snow blower, tar kettles, etc. Several locations were considered to erect a garage sized at 36-feet by 40-feet to meet airport equipment storage needs. The proposed location is shown on Drawing 3 –Ultimate Airport Layout Plan in Chapter 6 of this Master Plan.

The storage facility would provide a secure and weather resistant building to store the airports equipment and prolong its useful life.

The following chapter addresses prioritization and costs associated with the projects recommended.