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## ***Defining a New Coast: G.I.S. Reconstruction of Maillezais Abbey's Hydraulic Drainage Program and the Coastline It Created***

**By Mickey Abel, University of North Texas**

Maillezais abbey was founded by Duke William IV of Aquitaine and his wife, Emma of Blois, on the island of Maillezais in 970.<sup>1</sup>

**(fig. 1)** This island, measuring approximately 8 by 6 kilometers, was one of three located in the ancient Golfe des Pictons—a gulf that extended some 70 kilometers inland from the modern western coast of France, approximately mid-way between Brittany and Bordeaux.<sup>2</sup> **(fig. 2)**

Documents tell us that in 1003 and 1005 when Duke William V, the founding couple's son, came to power, he donated to the abbey what amounted to the entire island.<sup>3</sup> This included the large plot of land that had been the site of his grandfather's, Duke William III, Tête d'Étoupe (r. 935-963) hunting lodge. It was also where his parents had built their primary residence, part of which is still visible under the extant abbey's south wall.<sup>4</sup> **(fig. 3)** This generous donation, offered in his

<sup>1</sup> C. Treffort and M. Tranchant, "Maillezais, lieu de mémoire, lieu de pouvoir," in *L'abbaye de Maillezais: Des moines de marais aux soldats huguenots*, C. Treffort and M. Tranchant, eds. (Rennes, 2005), p. 9.

<sup>2</sup> N. Delahaye, *Histoire de la Vendée: des origins à nos jours* (Choley: Éditions Pays & Terroirs, 2003), p. 7. For the island's paleo-environmental history, see L. Visset and Y. Gruet, *Étude paléoenvironnementale réalisée sur une tranche perpendiculaire à l'hôtellerie côté marais* (Nantes, 1997), and Y. Gruet and P. Sauriau, "Paléoenvironnements holocènes du marais poitevin (Littoral atlantique, France): Reconstitution d'après les peuplements malacologiques," *Quaternaire* 5/2 (1994), pp. 85-94, who illustrate that the gulf was the result of the sea rising from 6830 BCE to 1160 BCE.

<sup>3</sup> G. Pon and Y. Chauvin, eds. and trans., *La fondation de l'abbaye de Maillezais: Récit de moine Pierre* (LaRoche-sur-Yon: Centre vendéen de recherches historiques, 2001), p. 34.

<sup>4</sup> E. Barbier, "Maillezais, du palais ducal au réduit bastionné," in Treffort and Tranchant, *L'abbaye de Maillezais*, p. 202-203. J. Bord, *Maillezais: Histoire d'une abbaye et d'un évêché* (Paris, 2007), pp. 13-15, states that this hunting lodge was built as an *aula* or hall, and that William IV and Emma transformed it into a fortified *oppidum*. Bord, pp. 71-2, lists all the donations the abbey received in the eleventh century and where they are recorded.



**Figure 1 Maillezais Abbey, western façade. Photo: author.**

mother's name, came with the stipulation that the abbey be relocated to this superior site.<sup>5</sup> It can be said that this action represents an early form of 'urban planning' in that it signals that both the duke, on the giving end of the gift, and the monks in receiving it, would have understood the strategic, i.e. commercial, political, and social implications of a relocation of this magnitude.

For purposes of this paper, the significant factor of this particular point in the abbey's history comes in the recognition that, while the relocated abbey was completed circa 1070,

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<sup>5</sup> Peter of Maillezais, *La fondation de l'abbaye de Maillezais*, Liber II [fol. 252 a], in Pon and Chauvin, *La fondation*, pp. 138-139. The issue of strategic site location in relation to water and other factors such as defense and commerce is addressed in J. Leguay, *L'eau dans la ville au Moyen Âge* (Rennes, 2006), pp. 15-48. Leguay, p. 79, sees this as an early form of urban planning in that the process entails stages of thought and analysis that engage administrative, financial, and execution problems.



almost immediately the monks embarked on an impressive expansion program, most particularly an extensive addition to the church's western façade, finished c. 1080/82.<sup>6</sup> (fig. 4) This more-



**Figure 2 Medieval Golfe des Pictons, after public map, Musée de Chateau Niort, Niort, France. Photo: author.**

prominent entry consisted of a massive 10 x 10 meter enclosed porch and narthex tower (*avant nef/narthex*), flanked by two multi-story stair turrets giving access to the tribune level and upper reaches of the tower.<sup>7</sup> Today, as a result of the employment of the abbey as a stone quarry

<sup>6</sup> Bord, *Maillezais*, pp. 67-68, illustrates these building phases and points to a fire in the nave in 1082 as the impetus for the later building campaign, this time expanding the chevet with radiating chapels. The dates for each of the phases are contested. See T. Cornec, "L'abbaye Saint-Pierre de Maillezais: L'architecture de l'abbatiale en partie rélévée par l'archéologie," *Bulletin de la Société Historique et Archéologique des Deux-Sèvres* VII/1 (1999), pp. 85-103; and M. Camus, "L'abbatiale de Maillezais," p. 165, 172, who notes the narthex tower, with its impressive stair turrets, appears to have been appended rather abruptly to a simple single story écran (flat)-wall façade that is still visible from the interior of the narthex. For an example of the use of these two types of architectural features, see M. Camus, "De la façade à tour(s) à la façade-écran dans les pays de l'Ouest: L'exemple de Saint-Jean-de-Montierneuf de Poitiers," *Cahiers de Civilisation Médiévale* 34 (1991), pp. 237-253. This suggests to me that either the decorative elements on the older façade were still in favor and considered appropriate for the interior of the new porch, or it was more efficient and timely to abut the two components rather than demolish the old façade prior to building the new.

<sup>7</sup> M. Camus, "Tours-Porches et fonction d'accueil dans les églises de Poitou au XIe siècle," in *Avant-Nefs & Espaces d'Accueil dans l'Église: entre le IVe et le XIIe siècle*, C. Sapin, ed. (Bourgogne, 2002), pp. 260-280; C. Heitz, "Rôle de l'église-porche dans la formation des façades occidentales de nos églises romanes," *Cahier de*



**Figure 3 Maillezais Abbey, Remnants of South Enclosure Wall. Photo: author.**

between 1725 and 1785, all that remains of this imposing façade are the first two stories.<sup>8</sup> I have argued previously that archeological evidence and architectural comparanda suggest that the configuration of this porch and tower would have been consistent with similar structures of Maillezais' caliber and monastic standing within the greater Poitou region.<sup>9</sup> Importantly, this dramatic, new façade would have been appropriate to the new site, not only because the abbey

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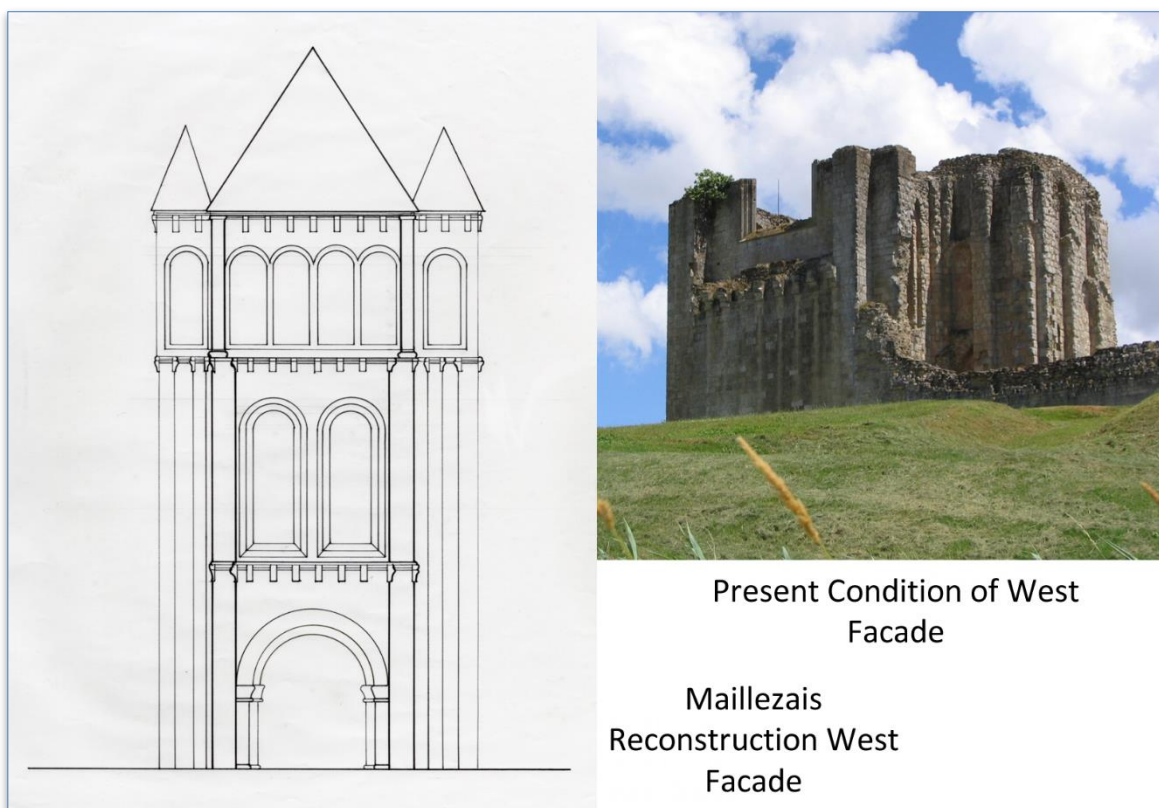
*Civilisation Médiévale* 34 (1991), pp329-334. For a reconstruction of Maillezais' narthex and tower, see M. Abel, "To Sea and be Seen: Reconstruction of the Strategic Building program at Maillezais Abbey," *Avista Forum Journal* 10 1/2 (2010), pp. 12-24.

<sup>8</sup> Bord, *Maillezais*, p. 187.

<sup>9</sup> Abel, "To Sea and be Seen," p. 16.



would then have been situated on the highest point of the island, but also because from this new location on the western side of the island, the abbey would have faced directly out to the open



**Figure 4 Maillezais Abbey, Reconstruction Drawing of West Façade. Drawing by Mary Stone Lamb.**

waters of the gulf. While this new location accommodated the ubiquitous east/west orientation of Christian churches, it would also have provided the monks a spiritual view that simulated the vision of sequestered seclusion associated with Saint John writing on the island of Patmos or Saint Hillary expelling the snakes from the paradisiacal island of Gallinara.<sup>10</sup> Conversely — and more strategically -- this new siting would also have served to place the abbey's new tower so that it would have been visible well out to sea, in essence facilitating the visual broadcasting of

<sup>10</sup> R. Dessi, "Images médiévales d'une île sainte: Patmos," pp. 281-300; C. Treffort, "Îsles et moines du littoral atlantique entre Loire et Gironde au Moyen Âge," pp. 319-334, both in *Lérins, une île sainte de l'antiquité au Moyen Âge* (Turnhout, 2009).

the monastic community's physical, and specifically Christian, presence in an area continuously under the threat of invasion and attack.<sup>11</sup>

While hundreds of the documents cataloged as being housed at Maillezais in the twelfth century, particularly those archived in the *Chambre des comptes* in Paris (1737), at the *Séminarie de La Rochelle* (1772), and finally in the departmental archives for the Deux-Sèvres (1815), have been lost to fires, we know by way of those associated with other monasteries in the region that the abbey played a significant role in Aquitainian politics by way of its patron affiliation with various members of the ducal family.<sup>12</sup> Primary documentation for the multi-phase building program at Maillezais, however, is found in an extant chronicle commissioned in 1067 by the contemporary abbot, Goderan,<sup>13</sup> and written by Peter of Maillezais, one of the resident monks.<sup>14</sup> Peter's telling of the monastery's history gives us a distinctly retrospective

<sup>11</sup> Because the gulf extended well inland, the area was vulnerable to maritime incursions by Breton, Vikings, Normans, and Muslims, from the seventh to the ninth centuries. See Y. Le Quellec, *Petite histoire du marais poitevin* (La Crèche, 1998), pp. 17-20; N. Delahaye, *Histoire de la Vendée des origines à nos jours* (Cholet, 2003), pp. 26-31. R Magnusson, *Water Technology in the Middle Ages* (Baltimore, 2001), p. 5, notes that these invasions destroyed much of what was left of the Roman water systems. Pon and Chauvin, *La fondation*, p. 47, note that, by the 11<sup>th</sup> century, the monasteries of the region were in their second wave of invasion, instigating an era of "castrum" mentality, with fortified chateaux built in Niort, Mareuil, Luçon, Mervent, Vouvent, as well as Maillezais.

<sup>12</sup> Notable sources are the chronicle of Saint-Maixent, a chronicle written by Ademar de Chabannes, a cartulary of Saint-Cyprien de Poitiers, and the *Gallia Christiana*. See R. Crozet, "Maillezais," *Congrès Archéologique de France, La Rochelle* (Orleans, 1956), pp. 80-96; Treffort and Tranchant, "Maillezais," pp. 7-16; and J. Sarrazin, "Maillezais et la mise en valeur des marais au Moyen Âge," in Treffort and Tranchant, eds., *L'abbaye de Maillezais*, pp. 365-366. As noted by the various authors contributing to Treffort and Tranchant's anthology, *L'abbaye de Maillezais*, the archival search for surviving documents pertaining to the abbey and its history in the Vendée has been exhaustive. Compiled results are found in Y. Suire, *L'Homme et l'environnement dans le Marais Poitevin, seconde moitié du XVI<sup>e</sup> siècle-début du XX<sup>e</sup> siècle* (Paris, 2002); É. Clouzet, *Les maris de la Sèvre niortaise et du Lay Xe au XVI<sup>e</sup> siècle* (Paris-Niort, 1904); and L. Delhomme, *Notes et documents pour servir à l'histoire de l'abbaye Saint-Pierre de Maillezais au diocèse de Luçon depuis sa fondation (976) jusqu'à son érection en évêché par le Pape Jean XXII (13 août 1317)* (Paris, 1961).

<sup>13</sup> Goderan, a Cluniac monk, was brought to Maillezais in 1060 by Guy-Geoffroi-Guillaume VIII, Duke of Aquitaine, to oversee the abbey's reform, a process that was begun under Pope Stephen IX, in 1057, who made Maillezais a dependent of Cluny. See, Pon and Chauvin, *La fondation*, p. 45; A. Richard, *Histoire des Comtes de Poitou, 778-1204* (Paris, 1903); and Michel Dillange, *Les Comtes de Poitou Ducs d'Aquitaine (778-1204)* (Paris: Geste Éditions, 1995), pp. 153-161.

<sup>14</sup> Peter of Maillezais (Petru Malleacensis), *De antiquitate et commutation in melius Malleacensis insulae et translatione corporis sancti Rigomeri*, 1.2 ed. Migne, *PL*, 146, 1247-1272. See also the translations by C. Arnould, *Histoire de Maillezais* (Niort, 1840); and L. Lacurie, *Histoire de l'abbaye de Maillezais depuis sa fondation jusqu'à nos jours* (Fontenay-le-Comte, 1852).

point of view, in that it goes to great lengths to provide the abbey with a miraculous foundation story in order to set the stage for the abbey's close political alliance with successive generations of nobility from both Poitou and the Touraine.<sup>15</sup> Importantly, it also serves to corroborate the geographic significance of the abbey's relocation. Analysis of this document, in association with the physical and visual evidence of the building itself, points to a propagandistic program of self-promotion, carried out jointly by the politically-astute abbot and the continuing line of Dukes and their wives supporting the monastic community.<sup>16</sup>

Searching more deeply, however, for the justification underlying the extravagant expenditure required for such an expensive new building program following so closely on the heels of the completed relocation project, it is intriguing that this same chronicle mentions the existence of the elements of an hydraulic system, specifically the "port d Maillé."<sup>17</sup> This is reiterated in the documents recording William V's donations to the abbey, which give the monks the rights to the locks on the Sèvre River, along with the rights to mills and circulation on certain levees, as well as mercantile exemptions at certain ports.<sup>18</sup> Moreover, Peter speaks of the contributions to the construction of these water features on the part of an indigenous people

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<sup>15</sup> É. Bozóky, "La légende de fondation de Maillezais," in Treffort and Tranchant, *L'abbaye de Maillezais*, pp. 17-29. For the significance of foundation stories, see A. Remensnyder, *Remembering Kings Past: Monastic Foundation Legends in Medieval Southern France* (Ithaca, NY, 1995). For the history of ducal patronage, see S. Rafalo, "Les ducs d'Aquitaine et l'abbaye de Maillezais (vers 970-vers 1100)," in Treffort and Tranchant, *L'abbaye de Maillezais*, pp. 326-333.

<sup>16</sup> L. Halphen, "L'histoire de Maillezais du moine Pierre," *Revue historique*, XCLX [sic] 1908, pp. 292-297; G. Oury, "La reconstruction monastique dans l'ouest: L'abbé Gausbert de Saint-Julien de Tours (v. 990-1007)," *Revue Mabillon* 54 (1964), pp. 69-124. For female patronage at Maillezais and the Poitou, see M. Abel, "Emma of Blois as Arbiter of Peace and the Politics of Patronage," in *Reassessing the Roles of Women as 'Makers' of Medieval Art and Architecture* (Leiden, 2012), pp. 823-861.

<sup>17</sup> Peter of Maillezais, Livre II [fol.255 v<sup>o</sup> a], in Pon and Chauvin, *La fondation*, p. 167.

<sup>18</sup> Bord, *Maillezais*, p. 71; and Arnould, *Histoire*, pp. 22-24. These citations are found in Père Louis Étienne Arcère, *Histoire de la Ville de La Rochelle et du pays d'Aunis*, II, (Paris, 1756), pp. 663-665; *Gallia christiana*, II, *Instrumenta ecclesiae Malleacensis sue Rupellensis*, col. 379-381. For commerce and exemptions, see O. Jeanne-Rose, "Ports, Marchands et Marchandises aspects économiques du Littoral poitevin (IXe – XIIe siècles)," *Les sociétés littorales de Centre-Ouest atlantique: de la préhistoire à nos jours: actes de colloque*, Centre international de la mer, Rochefort 5/4 (1996), pp. 131-137.



referred to as the “*colliberti*” or Pictons.<sup>19</sup> It is these native fishing people, who are credited as having shared their inherent knowledge of hydraulics with the monks at Maillezais. The combination of these references suggests that even before the monastery was rebuilt in its new location there was some level of hydraulic engineering taking place on or around the island of Maillezais.<sup>20</sup> Given the date of the chronicle (1067), it therefore seems likely that monks active in the abbey’s relocation and subsequent architectural enhancement were not only aware of the development of a system of dykes, levies, and canals within the parameters of the monastery’s domain, but were perhaps even participants in its on-going expansion and management. The question of how the two construction projects—the expansion of the abbey on its new site and the creation of hydraulic infrastructure—were linked seems relevant, if not foundational to our understanding of the monastic community’s economic status and political standing in the history of the Poitou region.

Frustratingly, archaeological and architectural scholarship on Maillezais has been focused rather myopically on the building chronology of the monastic structures, highlighting the Gothic and later stages when the monastery attained cathedral status as it became the Bishop’s seat (1317), thus slighting the more foundational question of the abbey’s socio-economic stature within the region in its early stages.<sup>21</sup> The problem here appears to be grounded in the self-

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<sup>19</sup> For a discussion on the disputed nature of these fishing people, see Lucien-Jean Bord, *Maillezais Histoire d’une abbaye et d’un évêché* (Paris, 2007), pp. 10-12; and M. Bloch, “Les ‘Colliberti’: Étude de la formation de la classe servile”, in *Revue historique* CLVII (1928), pp. 1-48, 225-263. The use of “Picton” refers more generally to these people’s status as native to the gulf region. They lived in the area around the port village of Marans until they were expelled in the 13<sup>th</sup> century. See L. Richemond, “Cartulaire de l’abbaye de las Grâce-Notre-Dame ou de Charon en Aunis,” *Archives historiques de la Saintonge et de l’Aunis* (Saintes, 1883), pp. 25-26.

<sup>20</sup> The citation is found in the chronicle of Peter of Maillezais, *La fondation*, Livre I[fol. 246 v<sup>o</sup> a]. See Pon and Chavin, *La fondation*, p. 94, “Etenim collibertus a cultu imbrium descendere putatur ab aliquibus. Progenies autem istorum collibertorum, hinc forte istud ore vulgi, multa interdum ex usibus rerum vera dicentis, contraxit vocabulum, quoniam ubi inundantia pliviarum Separis excrescere fecisset fluvium, relictis quibus incolebant locis, --hinc enim procul habitabant nonnulli—properabant illo, cause piscium.”

<sup>21</sup> For a summary of the archaeological work accomplished at Maillezais, see J. Martineau, “Maillezais: Deux cents ans d’archéologie d’une abbaye fortifiée,” in Treffort and Tranchant, *L’abbaye de Maillezais*, pp. 445-460. For the standing structure, see M. Camus, “Imaginer l’abbatiale romane de Maillezais,” and Y. Bloome, “La reconstruction

limiting questions that are the result of silo-like disciplinary interests, where standing stone structures, such as the relics of the monastery of Maillezais, fall generally to the purview of art or architectural historians, while archaeologists, who are all too happy to dig and provide us with the details of foundations, destroyed walls, buried layers, and bits and pieces of material culture, seem somewhat less interested in the material history of extant structures.<sup>22</sup> The stonework of infrastructure or hydraulic systems, on the other hand falls more definitively in the camp of archaeology, but is generally overlooked by architectural historians, and is found to be completely irrelevant by art historians. Compounding this dilemma, neither extant structures nor hydraulic infrastructure are of much interest to political or economic historians.<sup>23</sup>

I would argue, however, that we need to think more holistically.<sup>24</sup> If we are to understand the abbey's multi-phased building program in a more contextually rich manner, particularly in the exploration of the reasons compelling this institution to spend so lavishly on a grand new façade so soon after the completion of a rather extensive relocation project, we need to pursue a more inclusive, interdisciplinary approach. More specifically, if we are to understand at what point in the abbey's movement towards becoming the dominant monastic community in the region it realized the economic value inherent in a broad-based program of land management,

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en style gothique," both in Treffort and Tranchant, *L'abbaye de Maillezais*, pp. 253-289; as well as older scholarship of M. Camus and Y. Bloome, "L'abbatiale Saint-Pierre de Maillezais," *Congrès archéologique de France. 151<sup>e</sup> session. Vendée*, (1993), pp. 161-181; and "L'abbaye Saint-Pierre de Maillezais (Vendée: l'architecture de l'abbatiale en partie révélée par l'archéologie), *Société historique et scientifique des Deux-Sèvres* (1990), pp. 85-103.

<sup>22</sup> There are of course prominent exceptions to this generalization, for instance, C. Maines and S. Bonde, "Saint-Jean-des-Vignes in Context: Urban Water Management System in Medieval Soissons," *Wasser 4* (Regensburg, 1997), pp. 15-36. Making the argument for more integrated studies is, X. Barral I Altet, "930-1030: L'aube des temps nouveaux? histoire et archéologie monumentale," *La France de l'an Mil*, X. Barral I Altet, ed. (Paris, 1987), pp. 9-61.

<sup>23</sup> The prominent exception here is the work being done with English water systems. See for instance, J. Blair, *Waterways and Canal-Building in Medieval England* (Oxford, 2007); and S. Rippon, "Water and wetlands in medieval estate management: Glastonbury Abbey, Meare and the Somerset Levels in South West England," *Water management in medieval rural economy*, *Rulia V* (Lyon, 2003), pp. 93-112.

<sup>24</sup> Although dealing with material of a later era, C. Mukerji, *Impossible Engineering: Technology and Territoriality on the Canal du Midi* (Princeton, 2009), is exemplary of the model I am suggesting.

what we need is a more precise knowledge of the date and location of the earliest development of the hydraulic system. This holistic understanding will only come when we connect the various pieces of visual, material and documentary evidence.

From this broader point of view, I would suggest that the coincidence of the timing of the relocation of the abbey (1010), this new building's completion (1070), and the subsequent building of the western Narthex/tower (1080), with the mention of the hydraulic system in the abbey's chronicle (1067), is our first significant clue. It leads to the underlying supposition that Maillezais' elaborate and publically prominent building program was a reflection of more than the simple acknowledgement of the Duke of Aquitaine's largesse and political support. It seems likely that it was rather the prosperity of the abbey, sanctioned by the duke, but significantly sustained by the growing revenues provided by the early stages of the hydraulic system, that spurred the abbey to undertake such a dramatic and expensive remodeling program. As such, I would argue that the earliest segments of the canal system preceded the relocation and redevelopment of the abbey's buildings, and that the abbey's multi-phase building program was, more than likely, a direct response to the early economic success of the canal system. From this angle, first the relocation, but then, more dramatically, the re-modeling of the abbey church can be seen as political maneuvers meant to strategically situate the abbey in a position of physical and philosophical control over the lucrative infrastructure created in the early canal system.

The problem, of course, is how to demonstrate that by the time of the re-building and addition of the narthex tower, *c.* 1080, a system of dykes, levies, and canals around the abbey was not only well-established, but was providing the abbey with substantial revenues, so much

so that it had become a source of contention among the neighboring abbeys,<sup>25</sup> compelling the abbey to assert its ideological self-importance by way of the new monumental western facade.

As demonstrated in the Carolingian plan of the monastery of St. Gall and that of Canterbury, we know of the intimate correlation between monastic life and water.<sup>26</sup> Based on other better documented monastic communities known to have built hydraulic systems in the Middle Ages, we can reason that the community of monks at Maillezais would have benefited economically from the drainage of marsh land by way of dykes and levees.<sup>27</sup> This “hydraulic” approach to land management would have held the potential to create arable pasture and fields and to support the development of fish ponds, and salt beds — all of which would have contributed to the general health and well-being of the community. Importantly, a hydraulic management system with these components would also have held the potential to generate substantial revenue.<sup>28</sup> Similarly lucrative, the control facilitated by way of the diversion of river

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<sup>25</sup> P. Benoit and J. Rouillard, “Medieval Hydraulics in France,” in *Working with Water in Medieval Europe: Technology and Resource-Use*, P. Squatriti ed. (Lieden, 2000), pp. 161-215, esp. 169-173.

<sup>26</sup> W. Horn and E. Born, *The Plan of St. Gall: A Study of the Architecture and Economy of, and Life in, a Paradigmatic Carolingian Monastery*, 3 vol. (Berkeley, 1979); K. Grewe, “Le Monastère de Christchurch à Cantorbéry (Kent, Grande-Bretagne): Interprétation et signification du plan du réseau hydraulique (XIIe siècle), *L’hydraulique monastique: Milieux, réseaux, usages*, L. Pressuyre and P. Benoit eds. (Grâne, 1996), pp. 123-133 ; and K. Berthier, “Les aménagements hydrauliques de l’abbaye” in *Pour une histoire monumentale de l’abbaye de Cîteaux, 1098-1998*, M. Plouvier, ed. (Vitreaux, 1998), pp. 66-75, (*Cîteaux, Commentarii cistercienses. Studia et documenta*, 8). See also, M. Lillich, “Cleaniness with Godliness: A Discussion of Medieval Monastic Plumbing,” *Mélanges Anselme Dimer* 3/5 (Arbois, 1982), pp. 123-149.

<sup>27</sup> I refer the reader to the abundant bibliography in C. Maines, “Inside the Blackbox: The Technology of Medieval Water Management at the Charterhouse of Bourgfontaine,” *Technology and Culture* 53 (2012), pp. 625-670; and C. Maines “Saint-Jean-des-Vignes in Context: The Urban Water Management Systems of Soissons,” in *Wasser: Lebensquelle und Bedeutungsträger: Wasserversorgung in Vergangenheit und Gegenwart*, H. Paulus, H. Reidel and P. Winkler eds. (Regensburg, 1999), pp. 15-36.

<sup>28</sup> For saltbeds and salt marshes, see M. Gardiner, “Archaeological Evidence for the Exploitation, Reclamation, and Flooding of Salt Marshes,” *Ruralia* 5 (2005), pp. 73-83; and J. Sarrazin, “Le sel et l’aménagement du littoral Poitevin (XIIIe s.-début XVIe s.), *Les sociétés littorales de Centre-Ouest atlantique: de la préhistoire à nos jours: actes de colloque, Centre international de la mer, Rochefort* 5/5-6 (1998), pp. 143-161. For monastic appropriation of these features, see C. Treffort, “Moines, monastères et prieurés charentais au Moyen Âge: Quelques réflexions autour d’un projet collectif en cours,” *Annales de Bretagne et des Pays de l’Ouest* 113/3 (2006), p. 172 ; K. Berthier and J. Rouillard, “Nouvelles recherches sur l’hydraulique Cistercienne en Bourgogne, Champagne et Franche-Comté,” *Archéologie Médiévale* 28 (1998), pp. 121-147. R. Crozet, “Souterrains et caves voûtées à Maillezais (Vendée) et à Charrous (Vienne).” *Bulletin Monumental* 126 (1968), pp. 155-160, suggests that the vaulted underground rooms on the south side of Maillezais’ cloister were used for salt storage and opened directly onto Maillezais’ harbor.



water into canals, which would have held the potential to provide a perpetual flow of revenue through the taxes placed on the ubiquitous need for water-driven grain mills, as well as the tariffs placed on the commercial movement of goods, materials, and people.<sup>29</sup> It follows, therefore, that once in place, a hydraulic system would have been economically sustaining.

Economic historians highlight that this type of concerted growth in infrastructure came about most rapidly in situations where there was fragmented authority or a reduction in the territorial extent of the lord's jurisdiction, thereby creating a level of competition between numerous landlords.<sup>30</sup> This was indeed the political situation in the Poitevin marshlands at the beginning of the thirteenth century. Despite the broad-based nature of the Duke of Aquitaine's donations in the eleventh and twelfth centuries, to include his known extension of the ban to the various monastic communities in Poitou, records indicate that the community at Maillezais held a significant advantage over other monasteries and landholders in the region as a result of their particularly symbiotic relationship with their ducal patrons.<sup>31</sup> One could argue that this was because several generations of Dukes and their wives, from the founding by William IV and Emma in 987 through William III and his three wives in the late twelfth century, were intimately associated with the abbey and with the ducal palace at Maillezais.<sup>32</sup> In fact several family members are buried there.<sup>33</sup>

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<sup>29</sup> L. White, *Technology and Invention in the Middle Ages* (Oxford, 1940), pp. 141-159, shows that watermills represent one of the most "significant investments physical capital" in the Middle Ages. See also Benoit and Rouillard, "Medieval Hydraulics," pp. 178-180.

<sup>30</sup> K. van der Beek, "The Effects of Political Fragmentation on Investments: A Case Study of Watermill Construction in Medieval Ponthieu, France," *Explorations in Economic History* 47 (2010), pp. 369-380.

<sup>31</sup> C. Treffort, "Le comte de Poitiers, duc d'Aquitaine, et l'Église aux alentours de l'an mil (970-1030)," *Cahiers de civilisation médiévale* 43/172 (2000), pp. 395-445, esp. 417-428; and D. Callahan, William the Great and the Monasteries of Aquitaine," *Studia monastica* 19 (1977), pp. 321-342. For the extension of the *bannum*, see M. Bloch, *Land and Work in Medieval Europe*, J. Anderson trans. (Berkeley, 1967), pp. 136-168.

<sup>32</sup> See Abel, "Emma of Blois," pp. 823-861.

<sup>33</sup> See S. Refalo, "Les ducs d'Aquitaine et l'abbaye de Maillezais (vers 970-vers 1100)," in Treffort and Tranchant, *L'abbaye*, pp. 319-342.

More revealing of the nature of this relationship between the abbey, its abbot and the dukes of Aquitaine is, however, the original strategic siting of Maillezais and its importance to ongoing defensive of the gulf region. As I will argue, the earliest manipulation of the natural aquatic features or “river management,”<sup>34</sup> was no doubt beneficial to the monastery, but there is every reason to believe the Duke supported these projects because they specifically served his defensive program, securing the river access to inland sites as far away as the city of Poitiers. The need for defensive control of these waterways is chronicled throughout the region, illustrating the long history of incursions by Vikings, Normans, and Muslims who are known to have looted and destroyed many of the coastal monasteries from the seventh to the tenth century.<sup>35</sup> For Maillezais, the wild and unpopulated nature of the island within the open waters of the ancient gulf is the basis of the foundation legend told retrospectively in Peter of Maillezais’ 1067 chronicle.<sup>36</sup>

In addition to this narrative, Peter specifically describes the island’s topography and placement between the “l’Autise à l’est, et la Sèvre au sud,” and more specifically the two branches of the Autise River-- the Vieille Autise and the Jeune Autise, which serve to define the eastern and western boundaries of Maillezais Island.<sup>37</sup> Importantly, these two rivers give direct access to the mainland, making it clear that, even in the middle of the eleventh century, there continued to be a keen awareness of the island’s defensive possibilities. This is particularly significant as by that date the abbey had been moved from the eastern-most tip of the island, closest to the mainland, to the western side where it stood directly facing the open gulf.

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<sup>34</sup> See Sarrazin, “Maillezais,” in Treffort and Tranchant, *L’abbaye*, pp. 365-376.

<sup>35</sup> Treffort, “Le compte de Poitiers,” pp. 417-418 ; and J. Renaud, *Les îles de Vendée face aux Vikings* (Verrières, 2008).

<sup>36</sup> Peter of Maillezais, Livre I [fol. 246a]-[fol. 247 b], in Pon and Chauvin, *La fondation*, pp. 90-101.

<sup>37</sup> Peter of Maillezais, Livre I [fol. 246 b], Pon and Chauvin, *La fondation*, p. 93 and “Présentation,” p. 30.

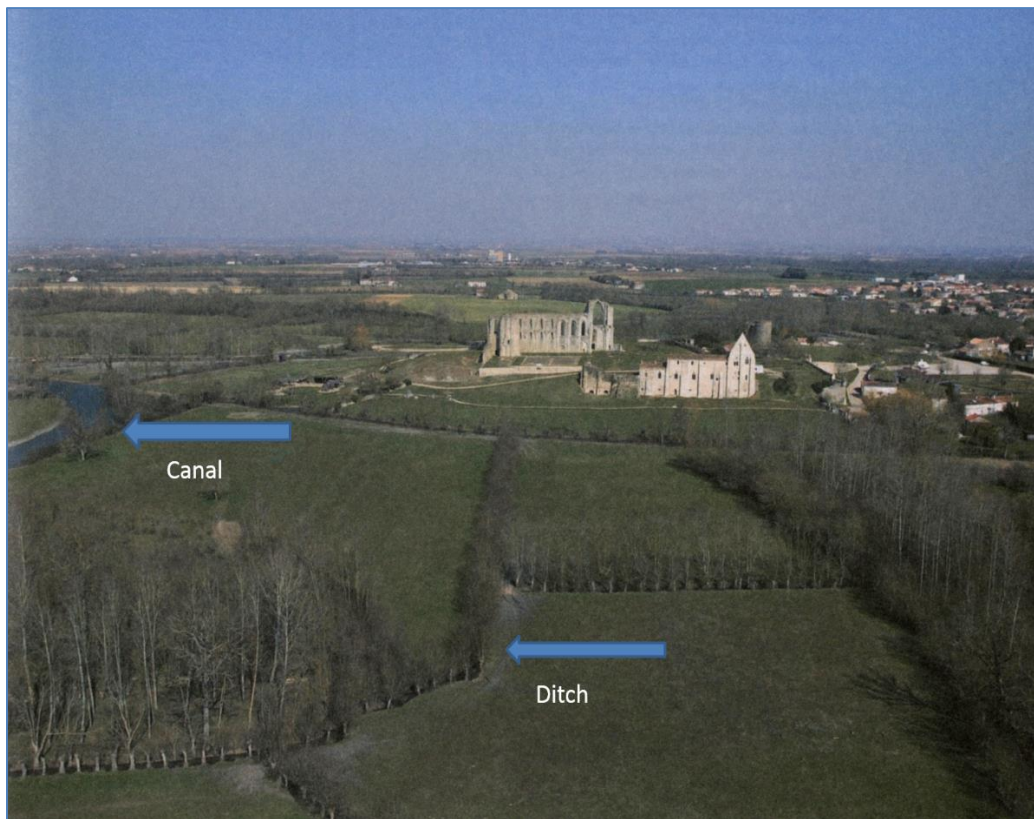


Figure 5 Golfe de L'Aguillon, Claude Masse. Photo: author.

While Maillezais' chronicle, like many self-referential historical documents, is not without suspicion of fraudulent or "enhanced" authorship, it can be said to reflect accurately the monastery's building chronology, as evidenced in the analysis of the extant structure.<sup>38</sup> This indication of historical accuracy lends some degree of confidence in the credibility of the chronicle's reference to the existence of some level of hydraulic development. Unfortunately, this document does not go on to provide us with the detail that would help locate the earliest

<sup>38</sup> Remensnyder, *Remembering*, p. 13.

phases of Maillezais' hydraulic project, nor does it signal what was hoped to be the project's desired outcome. We do, however, have two other significant sources of information that help in



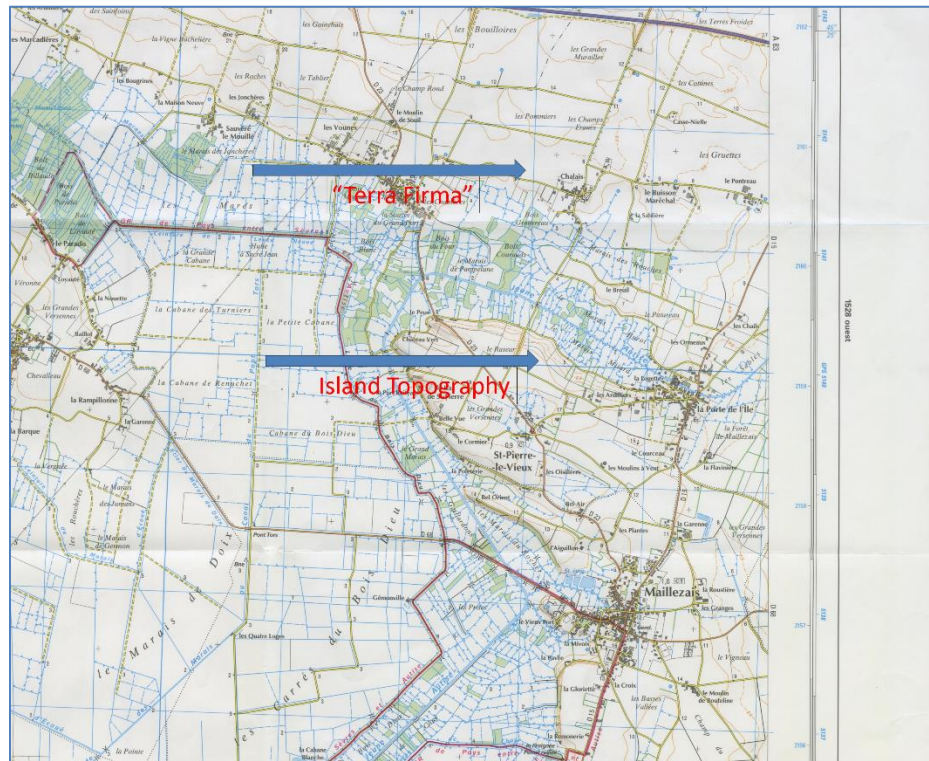
**Figure 6 View of Hydraulic features around Maillezais Abbey. Photo: author.**

the tracking of this information. The first is the modern and significantly extensive hydraulic system in place today, which covers the entirety of the former marshlands known collectively as the Golfe des Pictons. The second source is the impressively detailed set of maps for the region, drawn in the late seventeenth century by a cartographer employed by the king's corps of engineers, Claude Masse.<sup>39</sup> (**fig. 5**) At first glance, using these two sources as historical documentation for the medieval development might seem anachronistic. But as I hope to

<sup>39</sup> Y. Suire, *Cartes et mémoires de Claude Masse, Ingénieur du roi : La côte et les marais du Bas-Poitou vers 1700* (La Roche-sur-Yon, 2011).



demonstrate, both sources preserve glimpses into the distant past that should not be dismissed or overlooked.



**Figure 7** IGN# 1528 Ouest ,Topographic Map, Maillezais Island. Photo: author.

Beginning therefore, with a visual analysis of the landscape of the region as it stands today, one would hardly suspect in the vast expanse of farm and pasture, which stretches as far as can be seen to the north, west, and south of Maillezais abbey, that this land was once an inundated marsh. **(fig. 6)** A detailed topographic map recording the change in elevation levels, however, confirms the existence of elevated limestone outcroppings —or islands—rising a mere 10 to 12 meters above the low-lying alluvial basin. **(fig.7)** This type of map also serves in the identification of what would have been the ancient boundaries of the coastline of the Golfe des Pictons—the “terra firma” of the mainland to Maillezais’ east. Similarly, an elevated aerial view

like that possible from the open top of Maillezais’ now-truncated stair turrets, illustrates that this once marshy basin is now sectioned-off in individual fields or pasture-sized units, the individual sections identified by an intricate pattern of small ditches and larger canals, each lined



**Figure 8** Pollarded trees along the canal “contrabot.” Photo: author.

by centuries-old, pollarded Ash trees to protect their banks from erosion.<sup>40</sup> **(fig. 8)** The purpose of these tree-lined waterways, as it was in the late Middle Ages, is to drain the water away from those sections of land and, ultimately, move it into one of the six canalized rivers—the Sèvre, the Autize, the Vendée, the Lay, the Mignon, and the Curé, all of which drain into what remains of

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<sup>40</sup> Y. Quéllec, *Le Marais poitevin des Deux-Sèvres* (Fontenay, 1998), pp. 61-62.

the Golfe des Pictons, now referred to as the Baie d'Aiguillon. Even the very smallest arteries of this complex aquatic system are navigable by small, flat-bottomed boats, and, as in the past, larger watercraft can move easily from the Atlantic Ocean into the open gulf, through harbors at Saint-Michel-en l'Herm, Esnandes, and Marans, Maillé, or Maillezais, moving upriver through ports at Fontenay, Luçon, or Niort, with elevation changes along these routes accommodated by mechanized locks and diversion canals.

Also visible from an elevated viewpoint is the corollary system of surface roads, which continue to facilitate the movement of pedestrians, farm equipment, and commercial goods, even as they accommodate the hydraulic system with an equally complex system of bridges and overpasses. In some cases, these overland routes replicate the path of ancient Roman roads, like that linking the Roman coastal cities of *Lucionum* (Luçon), *Fontneiacum* (Fontenay), and *Niortum* (Niort), or that which crossed the marshlands between Fontenay to the port village of Marans, following the path of the Vendée river.<sup>41</sup> This visual analysis illustrates that water is essentially everywhere, and yet it is managed in such a way as to sustain the production of cereal grains and livestock on the lower levels, to support vineyards on the slightly higher ground, and to move people and goods between ports and dry land.

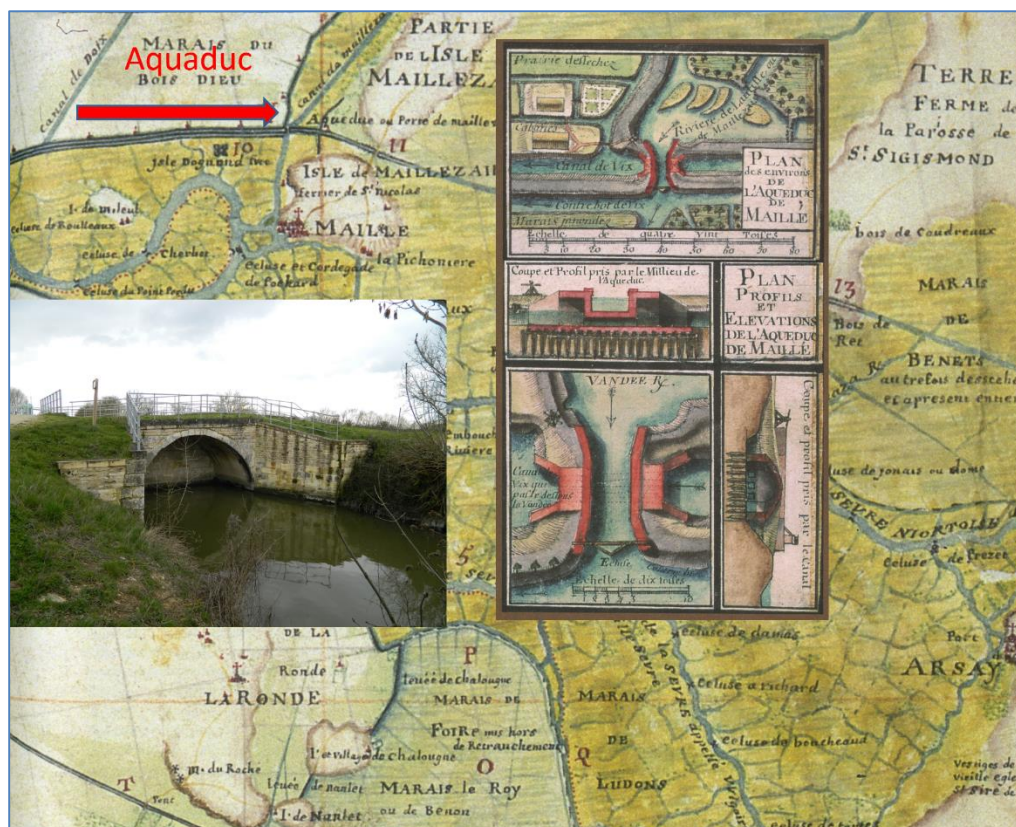
Environmentalists and landscape conservationists alert us to the sophisticated engineering built into this modern hydraulic system, noting that both the sustaining benefits of fresh river water and the detrimental effects of salinized farmland are acknowledged by the same hydraulic system that manages the destructive potential of seasonal flooding from the mountain-fed rivers, while accommodating the cyclical tidal patterns of the ocean. This planning can be seen most dramatically in the aqueduct located just outside of the village of Maillé, (**fig. 9**) which is

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<sup>41</sup> Y. Suire. "Les Marais avant les Dessèchements modernes, XVIe-début XVIIe siècle," in Treffort and Tranchant, *L'abbaye de Maillezais*, pp. 381-393 ; and Delahaye, *Histoire*, p. 19.



designed to take the fresh water of the Sèvre River over the top of the saltwater drainage canal, thus maintaining the separation of the two types of water, even as it anticipates the ebb and flow of both. Reiterating this aquatic differentiation, modern geographers label the land associated



**Figure 9** Aqueduct at Maillé with detail, after Claude Masse. Photo: author.

with these two types of water differently—the dry marsh (Marais desséché) referring to that land drained of its salty marsh water, and the wet marsh (Marais mouillé) referring to the more fertile land seasonally inundated by mountain-fed rivers.

Based on the complexity of this system, one could make the assumption that it is a wholly modern innovation. Historians and geographers studying the Early Modern era tell us



otherwise.<sup>42</sup> While it is clear by way of the modern materials used in construction, as well as the use of electric and computerized mechanisms, that there are indeed components of the system that date to the post World War era. What is perhaps more revealing with regard to the historical



**Figure 10 Locks on Sèvre River between Marans and Niort, after Claude Masse.  
Photo: author.**

questions at hand, is the recording of periods of the destruction and subsequent rebuilding of the hydraulic system, significantly in the Renaissance and early modern eras after the 100 Years War (1337-1453) and the Wars of Religion (1562-1598).<sup>43</sup> This historical documentation is important

<sup>42</sup> Delahaye, *Histoire*, pp. 6-13.

<sup>43</sup> Suire. "Les Marais," pp. 381-393, lists various battles fought in the region in the 16<sup>th</sup> century, citing the commercial importance of the port village at Marans and religious significance of Maillezais as the seat of the

to the current project because it brings us to our second source of information, the 17<sup>th</sup>-century maps drawn by Claude Masse.

The sophisticated and innovative surveying undertaken by Masse allows us to compare the modern hydraulic system with what was in place in the seventeenth and eighteenth centuries. It is in this comparison that we see that what Masse recorded was a reflection of what was actually on the ground--not a hypothetical or idealized rendition of what a hydraulic system might have looked like. In fact, much of what Masse recorded can be shown to still be in use today. For instance, we know from Masse's map that there were eight locks and seven diversion canals between the port at Marans and the inland harbor at Niort in operation in the seventeenth century.<sup>44</sup>(**fig. 10**) The modern employment of these same features in the same locations illustrates not only the enduring functionality of the system, but also the reliability of this important map. I will come back to Claude Masse and his maps shortly, but with these basic revelations, it is possible to make a few further suppositions about the medieval and pre-modern parameters of the hydraulic system. If indeed the rudiments of the hydraulic system were built in the eleventh century, then by the time of the recorded destructions in the fifteenth and sixteenth centuries, we can assume that the economic livelihoods of the local inhabitants would likely have been dependent on that hydraulic system. This suggests further that rebuilding after a period of disrepair would no doubt have been a priority. However, while improvement to the system after a period of destruction would have been inherently reasonable, from a practical stand point there is no compelling reason why local residents would have sought to "reinvent the wheel," building a completely new system. Rather more proficiently, they would more likely have proceeded with

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bishop, making both sites particularly attractive. François I is known to have organized a re-building of the hydraulic system in 1599, which had been partially rebuilt in 1560.

<sup>44</sup> Suire, *Cartes et mémoires*, pp.280-291. For the development of ports and harbors in the region, see Jeanne-Rose, "Ports," pp. 115-142.

a program of reconstruction that included the patching and reuse of old stone where feasible in order to make the system once again functional as quickly and economically as possible.<sup>45</sup> It does not follow, therefore, that all evidence of the early system would have been obliterated or carted away, even as we know there were periods of substantial destruction. In other words, if approached archaeologically, there ought to be evidence of the oldest parts of the hydraulic system at the foundation levels of some of its major features. Identifying these sites where this older stone has been preserved would serve to locate some of the oldest sections of the early-medieval hydraulic system.

These assumptions are supported by research undertaken in relation to the arrival of the Cistercians of the thirteenth century, who are known to have taken up residence on the islands that lie midway between the island of Maillezais and the present day coast of the Baie d'Aguilion.<sup>46</sup> (**fig. 11**) In a manner familiar to other Cistercian monasteries, the monks at six area monasteries brought their renowned expertise in hydraulics to the region and were instrumental in organizing a collaborative effort, linking their resources to execute a more substantial drainage program designed to manage the large central plain to the south and west of Maillezais.<sup>47</sup> Highlighting that much of this Cistercian organized system is still in place and functioning, this

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<sup>45</sup> For this type of reuse, see C. Maines, Saint-Jean-des-Vignes de Soissons: Utilisation, reutilisation et non-utilisation de la pierre lors de la période Gothique,” in *Pierres du Patrimoine Européen: Économie de la Pierre de l'Antiquité à la fin des temps Modernes*, F. Blary, J. Gély, and J. Lorenz eds. (Paris, 2008), pp. 131-142.

<sup>46</sup> Sarrazin, “Maillezais,” pp. 365-379; J. Sarrazin, “Les Cisterciens et la genèse du marais poitevin (France) (vers 1180-vers 1250),” in *L'hydraulique monastique: milieu, réseaux, usages*, L. Pressouyre and P. Benoît, eds. (Paris: CNRS éditions, 1996).

<sup>47</sup> For Cistercian hydraulics, see K. Berthier and J. Rouillard, “Nouvelles Recherches sur l'hydraulique Cistercienne en Bourgogne, Champagne et Franche-Comté,” *Archéologie Médiévale* 28 (1999), pp. 121-147. N. Faucherre, “Topographie médiévale de l'île de Maillezais, La capture de l'Autize,” in Treffort and Tranchant, *L'abbaye*, pp. 197-198, dates the Cistercian work in the Vendée to the period between 1180 and 1283. The six Cistercian abbeys responsible for this later work were La Grâce-Dieu, Notre-Dame de Charron, Saint-Léonard-de-la-Chaume, Moreilles and Trizay. Slightly later (1217), four Benedictine abbeys—Saint-Michel-en-l'Herm, l'Absie, Saint-Maixent, Nieul-sur-l'Autise—join forces with Maillezais to construct the “L'Achenal des Cinq-Abbés.”



scholarship tends to downplay the fact that when the Cistercians arrived, the foundations of a hydraulic system were already in place.<sup>48</sup> Nonetheless, what is important in this



**Figure 11 Islands (in pink) within the ancient Golfe des Pictons, after Claude Masse.**  
Photo: author.

scholarship is the validation it brings to the credibility of our second piece of evidence—Claude Masse’s seventeenth-century map. This is because the specific sections of the system attributed to the thirteenth-century Cisterians are indeed recorded on Masse’s map and appear to have been in working order, as suggested above, indicates that if they were damaged in either of the

<sup>48</sup> Faucherre, “Topographie,” pp. 197-198, on the other hand, suggests that the earlier canal work along the Jeune Autise preceded the drainage of the southwestern section of the Golfe des Pictons initiated by the Cistercians. Sarrazin, “Maillezais,” p. 368, discounts the earlier hydraulic work referenced in Peter’s chronicle, calling it river management, rather than the work of drainage.



fifteenth- or sixteenth-century wars, they were rebuilt in the same place and served the same function that they were designed to do in the thirteenth century. Moreover, because the



Figure 12 Hydraulic System iGolfe des Pictons, after Jaillot Map, 1707. Photo: author.

Cistercians are known to have been unconcerned with the area around Maillezais Island, suggests that whatever the Maillezais monks built in relation to their island domain, like that built later by the Cistercians, might similarly be recorded by Masse.

To corroborate the detail of Masse's maps, we do have early eighteenth- and nineteenth-century maps, like those drawn by Nicolas de Fer (1646-1720) and M. PrévotEAU in 1879.<sup>49</sup>

<sup>49</sup> M. Vannereau, "Evolution des cartes du Poitou et de la Saintonge du XVe au XVIII siècle," *Actes du quatre-vingt-septième congrès national des sociétés Savante* (Poitiers, 1962), pp. 265-292. Other cartographer families of note from the 17<sup>th</sup> century leading up to the time of Claude Masse are the Siettes, the Sansons (1600-1667), and after Masse, the Cassinis and the Roberts.

Unlike Masse's renderings, however, and reflecting a different mapping objective, these maps depict the coast of the gulf as stable and the land behind it as uniformly inhabited, with little suggestion that the Baie d'Aiguillon was once a much larger body of water. Some, like that drawn by Alexis Jaillot (1632-1712) (**fig. 12**) do, at least suggestively, illustrate a "hatch" pattern in the area once covered by water, which at first glance could be misunderstood as shorthand for furrowed fields. Here, it is only with knowledge of the actual landscape that one would recognize these markings as representing a complex system of ditches or channels. The generalization of these water features on these more-modern maps serves for my purposes to highlight the detailed accuracy found in Masse's earlier rendition.

Historians of cartography would point out that while the mapmakers of the eighteenth and nineteenth centuries were commissioned to address different agendas, the maps they produced are revealing of both the shifting administrative philosophy at the highest levels of French government as well as the technical advances within the field of geographic science and cartography.<sup>50</sup> They suggest that Masse's careful recording of the French coast, to include the Poitevin hydraulic system, was not only a foundational part of King Louis XIV's defensive program, but indicative of the detailed, all-inclusive vision he demanded. As such Masse's maps provide a particular vantage point onto the king's social and political agenda—an agenda that was at once innovative and progressive, while cognizant of historical precedents. Retrospectively, it is interesting that Louis had much the same vision that the dukes of Aquitaine had in terms of the value of hydraulic infrastructure as an element of security and defense, as well as a philosophy of land management. For this point of view, we need to understand the program within which Masse was working.

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<sup>50</sup> P. Even, "Claude Masse, Les cartes de l'ingénieur du roi," in *Adventures Scientifiques: Savants en Poitou-Charentes du XVIe au XXe siècle* (Poitou-Charantes, 1995), pp. 148-159.

Claude Masse was employed as part of the Louis IV's corps of engineers, but more specifically his work evolved from a plan developed under Jean-Baptiste Colbert in the 1660s, who held many titles, among them, Minister of Finance, Secretary of State, Navy, and Lands of the King.<sup>51</sup> Colbert and his successor, Vauban, carried out these duties as if the king's vast territory was one great estate—one where infrastructure was important to the health and well-being of the inhabitants. Chanda Mukerji calls Colbert's approach to this enormous task "land stewardship," stating that he employed an administrative philosophy of "mesnagement" politics, wherein the estate, "sanctioned by God," should be "developed for the well-being of the people through rational assessment of its virtues and vices, and the proper allocation of activities to appropriate sites around the countryside."<sup>52</sup> While veiled as a "dream of Eden," this approach was aligned with Colbert's founding of the French Academy of Sciences in 1666 and the French Observatory in 1667, where the new emphasis on astronomy facilitated the calculation of longitudes and what geographers have called a "cartographic revolution."<sup>53</sup>

The other side of Colbert's interests in social engineering and the forward-looking advances in science were his responsibilities as Minister of the Navy, where he was charged with the king's vision of empire. It is here that we see Colbert looking to the Classical past—not only the preserved relics of Roman infrastructure, so pervasive on the French countryside, but also the classical literature studied in the schools. Both were the material of the astronomer-geographers, military engineers, and civil surveyors like Claude Masse, employed by the King.<sup>54</sup> As Mukerji

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<sup>51</sup> Even, "Claude Masse," pp. 148-159. Masse's career actually began in 1679 under François de Ferry and eventually Vauban, successor of Colbert. He passed on his expertise to his sons, dying in 1737. See, R. Faille and N. Lacrocq, *Les Ingénieurs Géographes, Claude, François et Claude-Félix Masse* (La Rochelle, 1979), pp. 33-37.

<sup>52</sup> Mukerji, *Impossible Engineering*, pp. 7, 17-22, places Colbert's outlook in the post-Wars of Religion era, where the king's Catholicism was meant to be seen in contrast to the remnants of Huguenot presence. As such, his actions were signaled as having a virtuous and moral imperative.

<sup>53</sup> Even, "Claude Masse," p. 152.

<sup>54</sup> Mukerji, *Impossible Engineering*, pp. 8-14, 23, 28-30, states that each type of engineer had their area of expertise, those from the Royal Academy were mathematically based and interested in longitudes and altitudes; the military

suggests, the accomplishment of both social and military goals was dependent on precise knowledge of the land, “relying above all on geography and engineering,” as well as distinctive way of drawing maps developed by the civil surveyors, known as “arpenteurs/géomètres.”<sup>55</sup> Rather than the academic grid or topographic survey, this new type of map “referred to property markers set on the ground and mental maps of the landscape around them.”<sup>56</sup>

What is important to recognize here is that Colbert’s management program incorporated this new theoretical geography in order to address the king’s political goals.<sup>57</sup> In this endeavor, one might say that Louis XIV’s interest in the France’s defense system was obsessive. His desire to be able to “visualize” his entire kingdom and its defensive structures all at one time, inspired the creation of an enormous room where he could literally be surrounded by the display of large scale maps and three-dimensional models.<sup>58</sup> The surveyed detail of Masse’s maps, with their inset drawings of castles, towers, harbors and other fortified structures, was part of this vision.<sup>59</sup> The largest of Masse’s maps, which were created between 1688 and 1735, measure approximately 6 x 4 ft. Hundreds of smaller sectional maps of the 2 x 4 ft size accompany a

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engineers were focused on constructing of fortresses, ports, planning sieges and measuring frontiers, while the civil surveyors marked property lines and made maps of land parcels.

<sup>55</sup> Mukerji, *Impossible Engineering*, pp. 27-28, 32. The well-known Cassini maps and the cadastral program developed out of Colbert’s over-arching program of land management. Arpenteurs got their name from the standard lengths of chain (arpents) they carried for measurement.

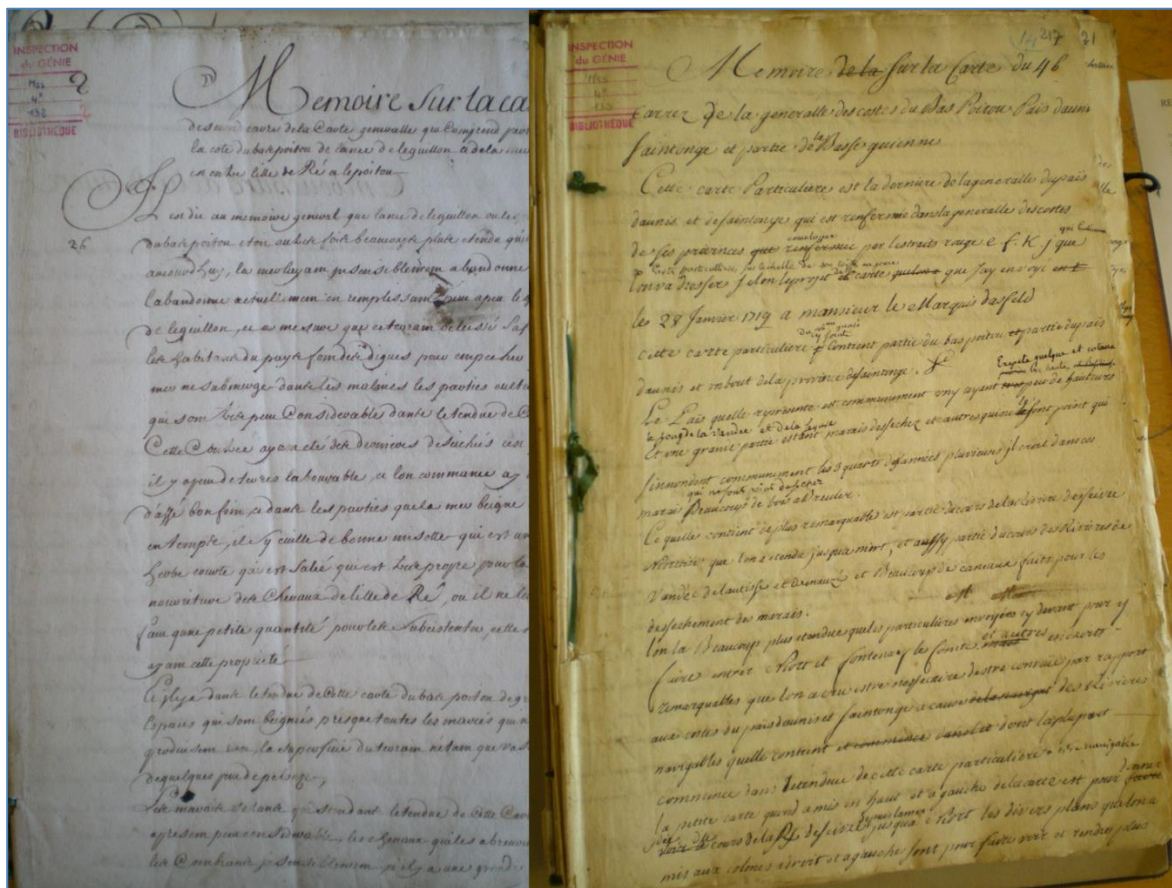
<sup>56</sup> Mukerji, *Impossible Engineering*, pp. 32-33. C. Duffart, “La Carte manuscrite de Claude Masse (fin du XVIIe siècle), sa valeur scientifique, principales modifications du sol landais qu’elle révèle,” *Bulletin du Comité des travaux historique et scientifiques* (Paris, 1902), pp. 274-284, makes the case that Masse’s maps recorded environmental shifts not found elsewhere.

<sup>57</sup> Suire, *Cartes et memories*, p. 9.

<sup>58</sup> Many of the three-dimensional models can still be seen in the Musée des Plans-Reliefs, housed in the Hôtel des Invalides in Paris. They were originally installed in the Louvre. See I. Warmoes, *Le Musée des plans-reliefs* (Paris, 1997).

<sup>59</sup> Cornec, “L’abbaye Saint-Pierre,” p. 88, suggests that the western façade and enclosure walls at Maillezais were fortified in the fourteenth century and again in the sixteenth century.

detailed, hand-written journal, now archived in Paris at the Bibliothèque du Génie, Chateau de Vincennes and at various regional archives, like that for the Vendée, at La Rochelle.<sup>60</sup> (fig.13)



**Figure 13 Claude Masse, Journal Pages, Bibliothèque du Génie, Chateau de Vincennes. Photo: author.**

For the purposes of understanding Maillezais' role in the development of the early hydraulic system, it is fortuitous that the king was not only interested in defensive structures like Maillezais abbey, which was fortified in the fourteenth century, but also these defensive sites' supportive infrastructure, to include bridges, levees, and canals--all of which could be breached

<sup>60</sup> Y. Sire, *La Côte et les Marais du Bas-Poitou vers 1700: Cartes et Mémoires de Claude Masse Ingénieur du Roi* (La-Roche-sur-Yon, 2011).



as a mechanism to cause the dysfunction and chaos that lead to security breakdowns.<sup>61</sup>

Providing Colbert with the details the king required, Masse spent the majority of his adult life surveying and recording the northern and western coastlines of France, his work continued after his death by his sons.<sup>62</sup> The result of this long project is a set of maps of incredible surveyed accuracy, which include details of everything from minute depth readings in the water to multifaceted drawings of the operation of sluices and locks. (**fig. 14a**) It is this detail, particularly in the recording of the hydraulic system, that these maps become useful in our search for the origins of Maillezais' early hydraulic system.



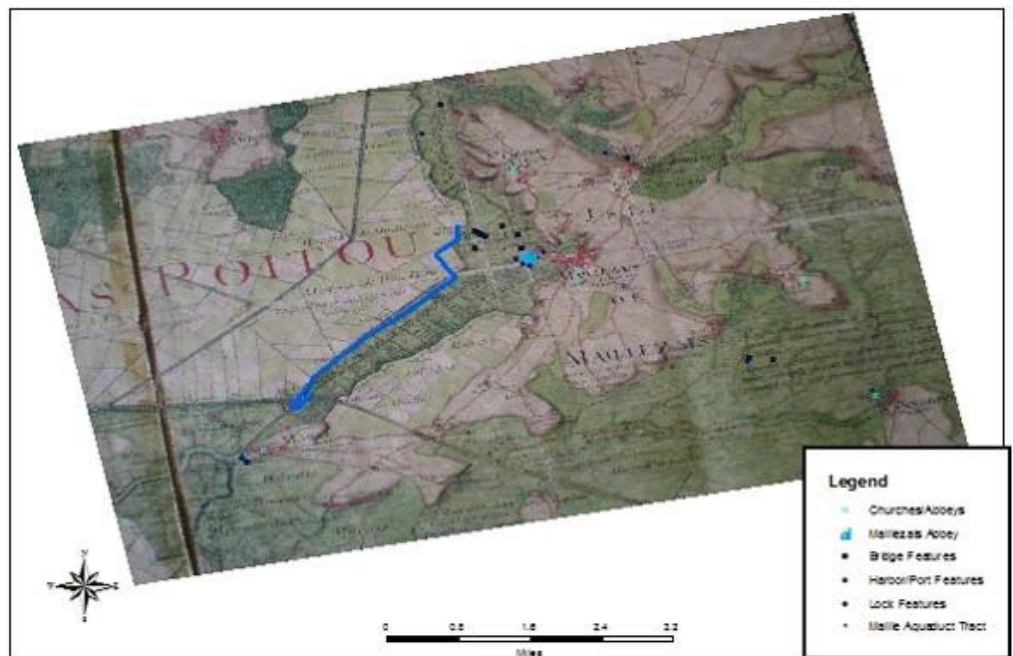
**Figure 14a Details of Locks/ Modern Infrastructure, after Claude Masse. Photo: author.**

<sup>61</sup> Mukerji, *Impossible*, pp. 30-31, explains that this line of thought was developed under Colbert, who employed astronomer-geographers, military geographers, and civil surveyors in the service to the King to produce maps of extant defensive features, “especially waterways and rock outcroppings” and “counter-topographies of tunnels, landslides” that “were at the heart of war and military cartography.”

<sup>62</sup> R. Faille and N. Lacroq, *Les Ingénieurs Géographes: Claude, François et Claude-Félix Masse* (La Rochelle, 1979).

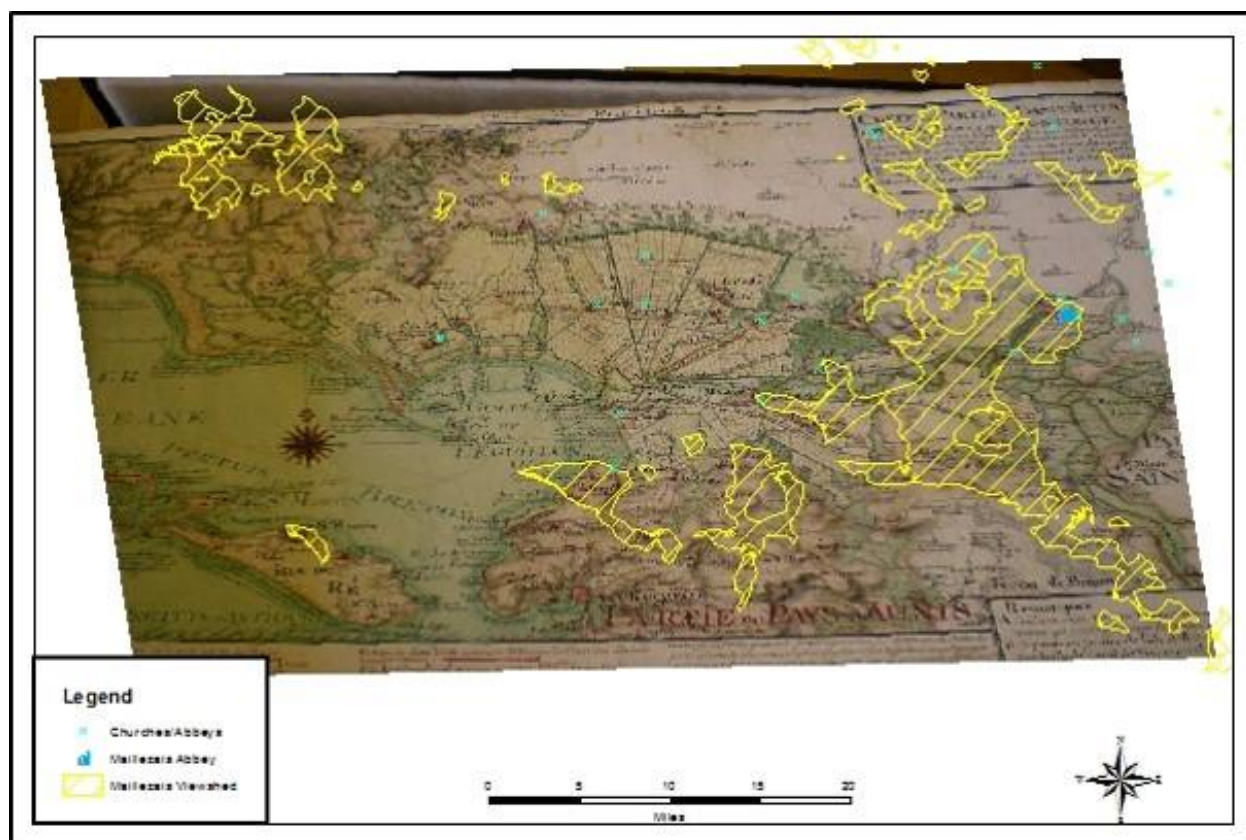
Thus as a way to situate and visualize the matrix of social and political factors that make up the correlation between the abbey's economic status and its physical environment, an interdisciplinary program of electronic mapping was devised. Employing a team comprised of two geography and two art history graduate students, this program was meant to bring the scientific accuracy of Geography, through the employment of a Geographical Information System (G.I.S.), to the visual analysis inherent in the study of architectural history. The basic goal was to expand not only the range of data to be considered, but also the depth of analysis, and thus facilitate the visualization of nuanced layers of criterion and intricate relationships of data not otherwise possible through traditional art historical methods. At the basis of this mapping program--tracking these somewhat nebulous factors through time and space--was the tangible and enduring evidence of stone, witnessed today in the way it was cut, laid, and built upon.

**Figure 14b G.I.S. Image of Maillezais Levee with G.P.S. tracking along canal, after Claude Masse. Photo: author.**



As suggested above, the first step in this program was to verify the accuracy of Masse's recordings. This was accomplished by way of several G.P.S. trackings of the team's movements along waterways and levies that we found to be recorded both on a modern topographic map and on Masse's seventeenth-century map. (fig. 14b) We

discovered that once Masse's maps were ortho-rectified and geo-referenced, the features Masse recorded were indeed measured and drawn to modern levels of accuracy.<sup>63</sup>



**Figure 15 G.I.S. generated Maillezais Viewshed (in yellow) with medieval sites indicated as G.P.S. points (in blue), after Claude Masse. Photo: author.**

With this knowledge, we added other “known” sites in the region relevant to the history of Maillezais, such as the other two monastic foundations referenced in the Maillezais chronicle— St. Michel de l’Herm, founded in the 682, which is located to the west of Maillezais at the entrance to the gulf,<sup>64</sup> and Notre-Dame de Luçon, on the gulf’s northern edge—as well as Maillezais’ parish churches and other ecclesiastical foundations dating to the early medieval period. Categorizing these buildings by date facilitated a “phased” mapping of other data.

<sup>63</sup> See Dienes article in this volume.

<sup>64</sup> Renaud, *Les îles*, p. 10.

Thus employing this geo-referenced version of Masse's map as our "terra firma," the team of geographer/art historians set out on a program of surveillance, combing the region for visual evidence of medieval stone, entering each siting as a G.P.S. generated point on our G.I.S. map. Following the logic described above, we assumed that even as there might well have been multiple periods of destruction and rebuilding at any given site of infrastructure, we might hope to find evidence of medieval stone at the lower foundational levels. And indeed wide-spread evidence of medieval stone was discovered to have been employed in parts of many different hydraulic features. (**fig. 15**)

As exciting as these discoveries were, they do not necessarily help pinpoint the parts of the system built by Maillezais in the eleventh and twelfth centuries. In order to refine the chronology of our findings, we had to formulate a system of visual criteria for the dating of medieval stone in order that each site could be "phased" according to date. Geographers call this "age-referenced." Given the knowledge that the "islands," of the gulf, including Maillezais Island, were nothing more than limestone outcroppings rising at the most only 10 meters above the marsh at sea level, and that there were known quarries directly up the Sèvre river from the abbey towards the town of Niort, the assumption was made that, like other medieval structures of the region, construction of infrastructure would also be of limestone. In many instances, however, the differentiation between the stratification and erosion patterns of the limestone bedrock and the slightly irregular coursing of natural or uncut limestone construction were difficult to discern. This problem is particularly clear on Maillezais' eastern enclosure wall, where the stone coursing melds almost imperceptibly with the stratified bedrock. (**fig. 16**) This type of transition from bedrock to natural stone coursing is even more elusive when under even a few inches of water.





**Figure 16 Maillezais, Wall built on top of natural “Island” strata. Photo: author.**

More clearly differentiated, however, were the various techniques for cutting limestone found within the abbey itself, which in a general sense can be said to become ever-more refined and precise over time. As these variations are associated with the dated expansions and remodelings of the architecture, they provided a suitable template for not only the visual training of the team, but importantly the dating of the stone employed in the region’s infrastructure. Without the benefit of more scientific methods of dating stone, the field program relied on the architecturally phased dating of the abbey’s stone to refine our skills as visual connoisseurs of limestone, and in so doing developed a visual methodology for chronologically categorizing the



**Figure 17 Maillezais Abbey, Interior, West Narthex. Photo: author.**

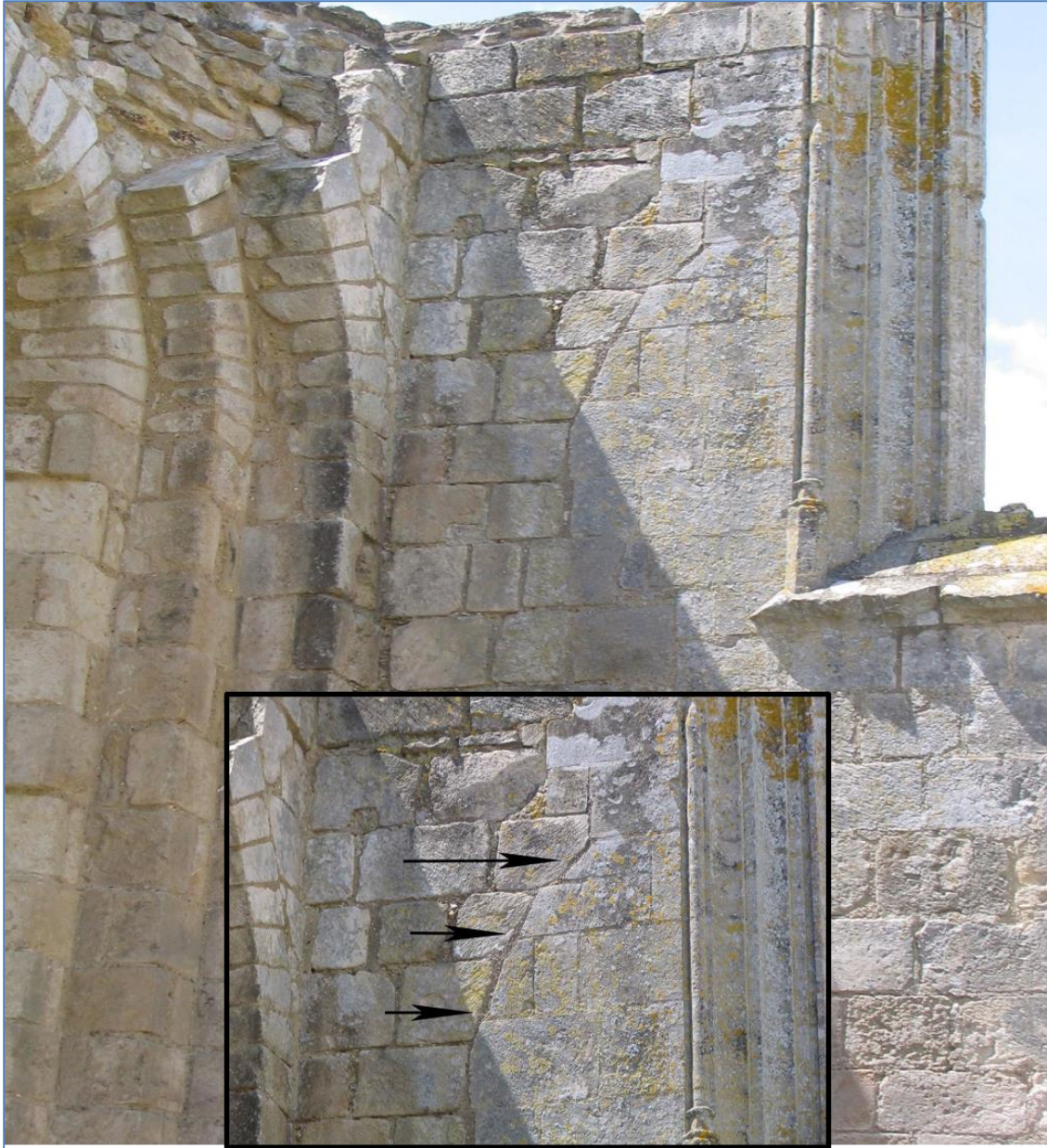
cutting technique and general size of the stones.<sup>65</sup> Here the dating chronology was correlated with a general progression from roughly cut stones to those cut with skilled precision, and from relatively large ashlar blocks to smaller individual stones. Within the abbey itself there are many examples where there is evidence of these visual criteria that can be dated by

documentary evidence. For instance, in the interior of the western narthex (**fig. 17**) with its large ashlar blocks laid in regularized coursing, the portal opening of the eleventh-century western entry can be seen to have been filled with a very different style of stonework, here much smaller stones laid in irregular courses with ample mortar. We have documents telling us that this juxtaposition of two styles of masonry was the result of a fortification project in the fourteenth

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<sup>65</sup> This connoisseurial approach uses what E. Woillez, *Archéologie des monuments religieux de l'Ancien Beauvoisis pendant métamorphose romane* (Paris, 1839-49) calls “des principes d’une école de rigoureuse observation.” The method was, however, complicated somewhat by the work of modern restoration programs, where the craftsman has quite successfully replicated the stonecutting techniques of a previous era, as in the abbey’s eastern entrance bridge, which was restored in 2008.





**Figure 18 Maillezais Abbey, upper narthex window replacement scar. Photo: author.**

century that eliminated the western entry. While the crude patchwork used to fill the space of the portal opening was probably plastered over to provide a smooth surface for painting, its current revealed state provides a clear example of two very different methods of stone construction. Similarly, in the upper floor of the narthex, (**fig. 18**) the eleventh-century, two round-headed



**Figure 19 Maillezais Abbey, conversi kitchen. Photo: author.**

windows were replaced in the late thirteenth century with a singular Gothic window with sophisticated moldings and a pointed arch, thus illustrating vividly the refinement in stone cutting techniques that developed in this time period. Even more intricate and precise stonework can be found in the conversi's domed kitchen (c. 1400), (**fig. 19**) which is juxtaposed with the rougher work of an earlier fireplace. Defining the chronology, each of these examples were used to refine and hone the team's visual skills.

In the end, the final process of chronological analysis of each point on our map suggested some preliminary revelations that have served to confirm our original hypothesis and define the next stages of inquiry. Areas on the map with dense coalescence of sites with early (10<sup>th</sup> and 11<sup>th</sup>





certainly be argued that maintaining the river passage between Niort and Maillezais would have been essential for the movement of building materials—most particularly limestone and lumber from the nearby quarry and forests necessary for the early construction projects both at the abbey and at Niort’s prominent castle complex. Opening this length of the river would have required the building of channels in some places where the water level was low in order to maintain an appropriate depth for navigation, and the installation of locks in other places to deal with the changes in elevation. Several have been modernized and are still in use, but many more of these locks are indicated on Masse’s map.

Corroborating the importance of this waterway to construction projects at Maillezais is the port/canal/lock system built close to Maillezais’ first parish, at Maillé, which has a foundation date of *c.* 1010.<sup>67</sup> (see **fig. 9**) This village and hydraulic complex lies at the southwestern tip of Maillezais island where the Sèvre, coming from Niort, joins the westward flowing Autize River and may well be the site of *Confluvium*, a Roman settlement mentioned in the chronicle as where “the rivers come together.”<sup>68</sup> In addition to its port function, regulating the entry of goods moving between Niort and the open waters of the Golfe des Pictons, the hydraulic system at Maillé would also have served as an important security gate for boats moving up the Autize to Maillezais’ own harbor located just to the north of its prominently situated western façade. Much of this system has been updated and modernized as described above in the sophisticated accommodation of both salt and fresh water, maintained as separate by way of an aqueduct crossing. Tellingly, medieval stone is quite visible in the arched underpasses of this elaborate system.

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<sup>67</sup> L. Brochet, “Maille,” in *Les Environs de Maillezais* (Paris, 1989), pp. 83-91, states that there was a “Pictonnière” port at Maille as early as 540, as well as an ancient chapel dedicated to St. Pient, which was in ruins in the eleventh century when it was replaced by the extant church dedicated to Saint Nicolas.

<sup>68</sup> This is listed as *Confluentium* on a map in Pon and Chauvin, *La fondation*, p. 31.



The third site of importance was located at the head, or eastern end of Maillezais Island. (fig. 21) The village of Porte de l'île marks the point where the island is connected by a causeway to the “terra ferme” of the mainland, and where the Autise river flowing from the eastern forests meets the marshland, splitting to become the Jeune Autise and the Vieille Autise and therein defining the east and west sides of the island. Here, strategically at this “gateway,” and not too far from the original site of the abbey at St. Pierre le Vieux, there is significant evidence of an early medieval mill, which would have benefited from a diversion of the Autise river’s water. Even today, an enormous modern mill, just meters downstream from the medieval site, takes advantage of this same flow of water.

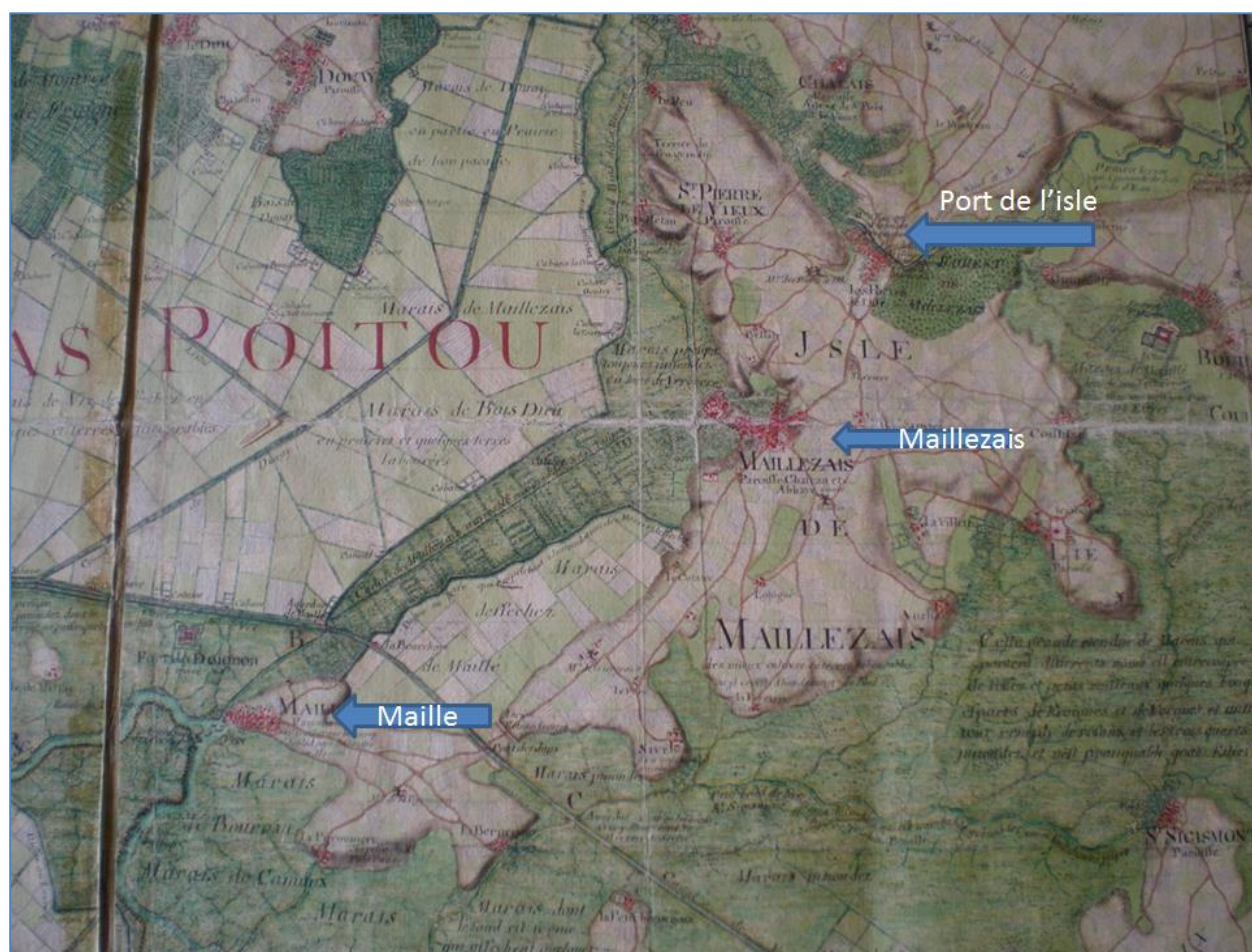


Figure 21 Maillezais Island, after Claude Masse. Photo: author.

The last important feature that completes our estimation of Maillezais' original hydraulic system is the levee—or Bot/countrabot-- that runs parallel to the canalized Autize on the north side of the abbey.<sup>69</sup> (**fig. 22**) This feature would have served to hold back the marsh waters to the north and west, diverting their tidal flow to a lower part of the Autize, thereby creating what we feel would have been the first expansion of the abbey's arable land, while ensuring the abbey a consistent source of fresh water for both irrigation and drinking.

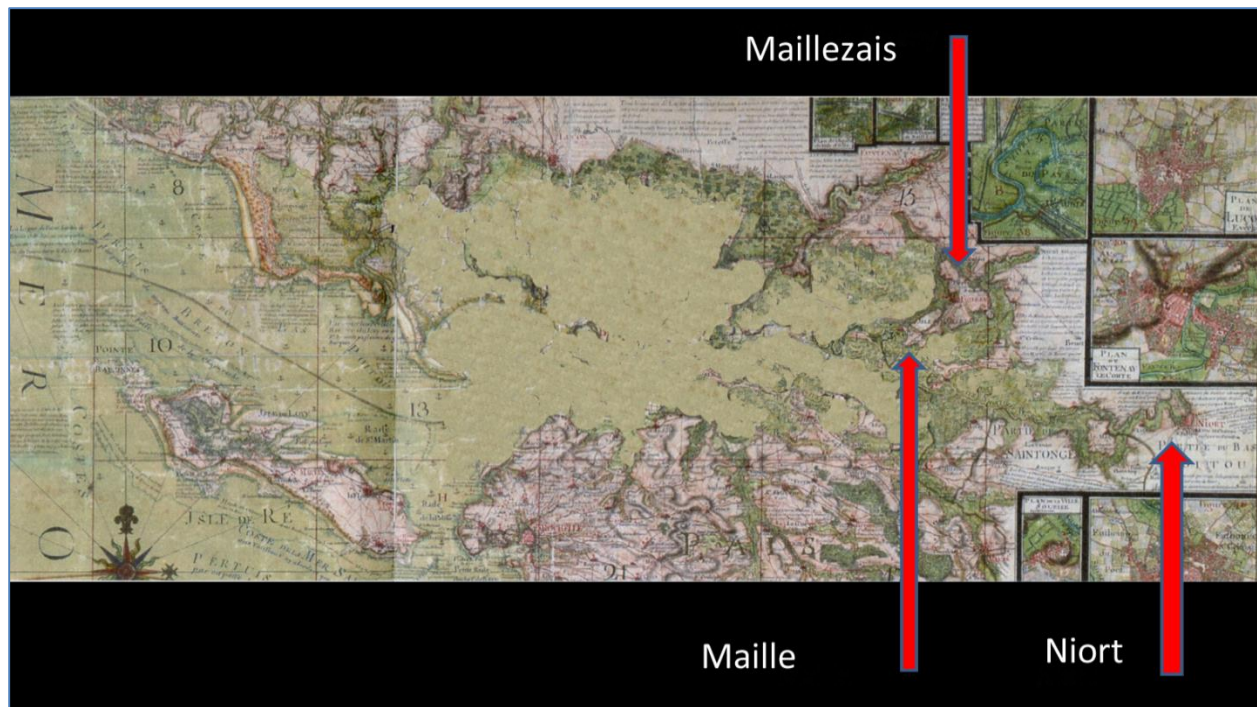


**Figure 22 Bot/ Counterbot. Photo: author.**

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<sup>69</sup> Sarrazin, "Les Cisterciens," p. 115, explains the process of "abbotamentum" where parallel drainage features—a larger one, generally called a "clausura" or "achenal," canal, and a smaller channel called a "contrabotum" are divided by a "botum" or levee, which has "cois" or sluices which can be opened and closed allowing excess water to flow from the contrabot into the achenal, which in turn moves the water into the river. The clausura and contrabot also function to preserve the bot from the destruction of people and animals.





**Figure 23 A Manipulated Map of Medieval Golfe des Pictons, after Claude Masse. Photo: author.**

Manipulating Masse's map in relation to our GIS generated viewsheds, erasing everything other than these four sites of medieval infrastructure, allowed us to approximate a view of the eleventh-century coastline, and thus imagine what would have been visible from Maillezais' new narthex tower. **(fig. 23)** Combined with the information garnered from the analysis of the stone used in hydraulic infrastructure, such as dykes, levies, bridges, canals, wells, irrigation systems, laundries, and mills, this mapping enhances our understanding of the political, social, and economic issues underlying the multi-faceted development of a large monastic community in ways that corroborate our reading of written documents and the extant structure itself. Given the paucity of supporting documents, the environmental evidence supporting this reconstruction is quite revealing—that is, examining the architectural development from the basis of local geology, relative topography, and the inherent benefits of hydraulic engineering in a region defined by water, allows us to paint a picture of the economic avenues of supply and demand. This information

informs our understanding of the abbey's integral position within the dynamic relations of Aquitainian politics, and thus state more definitively that Maillezais' innovative control of their physical environment was responsible for making them both rich and powerful, such that the impressive western narthex tower would have been seen to be an appropriate and timely statement of the monastery's prominent social position. (fig. 24) 🏰



**Figure 24 Manipulated Image, hypothetical view from Maillezais Abbey tower before hydraulic projects. Photo: author.**