

**Brú na Bóinne World Heritage Site
N2 Slane Bypass**

Heritage Impact Assessment

16 February 2011

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Brú na Bóinne N2 Slane Bypass Heritage Impact Assessment

1. Use of This Report

This Heritage Impact Assessment has been prepared (see Appendix A for author Curriculum Vitae) as recommend in the document, *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS, January, 2011). It provides, among other things,

- a brief description of the N2 Slane Bypass project that might affect the outstanding universal value of the Brú na Bóinne World Heritage Site,
- a discussion of the ways that the outstanding universal value¹ of the site might be effected,
- the manner in which the research necessary to making the assessment was conducted,
- the logic behind the assessment,
- an assessment of the magnitude of impact on the outstanding universal value of Brú na Bóinne World Heritage Site were the proposed development to go ahead (based upon the information available at this time; oral hearings on the project are being conducted as this is being written), and
- a list of lacunae, or missing information, pertinent to the project that might alter the assessment of impact were it made available and likely to be requested by the World Heritage Committee and ICOMOS in the future.

This assessment does not purport to represent the opinion of the World Heritage Committee, nor does it obligate them in any way should they consider the impact of the proposed development in the future. Should this be done, the World Heritage Committee will draw largely from input provided by ICOMOS. This assessment attempts to anticipate the issues of interest to the World Heritage Committee and ICOMOS, and, to some extent, the decisions that they might make. It is to make this assessment of greater use to An Bord Pleanála that the lacunae are listed, these being,

¹“... properties of ‘Outstanding Universal Value’ ...are part of the “world heritage of mankind as a whole” and deserve “protection and transmission to future generations”. Such properties are recognized through inscription on the World Heritage list by the World Heritage Committee, which consists of representatives from 21 States Parties. Their OUV is fixed by the World Heritage Committee at the time of inscription and since 2007 has been encapsulated in a Statement of OUV. OUV thus defines the thinking at the time of inscription and is non-negotiable (p, 1 *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*, January, 2011).



bedroom community to Dublin in recent decades, it is reasonable to anticipate development pressure that will include landscape elements that are incompatible with an archaeological and historical landscape.

Assessments such as this are intended to be helpful to States Parties, the Advisory Bodies and the World Heritage Committee, relevant to the World Heritage context in general and specific properties in particular, and to be a catalyst for discussions that can identify how negative impacts to the outstanding universal value of a World Heritage Site can be avoided, reduced, rehabilitated, or compensated.

2. Outline of the Proposed Development

The proposed development is the construction of the N2 Slane Bypass, which would give vehicles traveling on the N2 the option of skirting Slane. As currently proposed, this would be located to the east of the historic village of Slane, about 500 meters at its closest point from the buffer zone that has been established for the World Heritage Site of Brú na Bóinne. The bypass would be approximately 3.5 kilometers long. The bypass road would be a '2+2', officially called a Type 2 Dual Carriageway, which consists of two lanes per carriageway separated by a narrow median containing a wire rope barrier (as illustrated in Photograph No. 3.8 of Volume 1 of the EIS; and in the cross section on Fig 3.16 of Volume 2 of the EIS). The bypass would cross the River Boyne on a bridge that is 1.1 kilometers east of the historic bridge that crosses the river just south of center of the village of Slane. The lower portion of the bridge would be about 18 meters above the River Boyne Bank (Section 3.3 on Page 3-6, Volume 1 of EIS) and about 21 meters at mid span above the river (see figure 3.8 in volume 2 of the EIS). Figure 1 displays the currently proposed alignment (in red) of the N2 Slane Bypass.

Traffic would enter the bypass via roundabouts. The roundabout on the south side of the River Boyne would be located immediately north of Mc Gruders Cross. Northbound traffic would follow the road east from the roundabout, in the direction of the World Heritage Site, and then turn to the north. The roundabout on the north side of the River Boyne would be located near the Ledwidge Cottage Museum, the historic cottage of Francis Ledwidge, whose poetry reflects the beauty and pastoral nature of the area around Slane. Southbound traffic would turn southeast from the northern roundabout, again in the direction of the World Heritage Site for a distance of approximately 300 meters, before turning south.

The September, 2002 *N2 Slane Bypass Constraints Study Report* states that, "No objections to the decision to look solely to the east of the village for potential bypass routes were received. This decision is also supported by previous studies carried out on potential bypass routes" (Section 6.1, page 48). Several alternate routes were considered in the *N2 Slane Bypass Route Selection Report*, June, 2005. The alignment above was selected because it was judged to have the fewest negative effects on environmental and cultural resources in the vicinity (although not explicitly on the World Heritage Site), and to be the most cost-effective



2. a. Purpose of the Proposed Development

The construction of the bypass is intended to relieve dangerous traffic congestion in the historic town of Slane. Slane is debilitated economically and socially by the volume and nature of the traffic that passes through it. A number of horrible deaths and injuries have been caused by this congestion, in particular because many heavy goods vehicles (HGVs) move through the town each day. As reported by the Meath County Council Infrastructure Section in 2009, 7,800 vehicles moved through the village each day. Of these, 20.4% were HGVs on the south side of the village and 24.8% were HGVs on the north. This would indicate that approximately 1,600 HGVs travel through Slane on the N2 each day.

The nexus of traffic congestion occurs at the bridge that crosses the River Boyne, which flows east to west and roughly bisects the town (hence the above reference to the south and north sides of the village). The slope of the N2 on both sides of the river leading to the bridge is severe, but the north slope is the steepest. The historic bridge provides only one lane. Drivers going in either direction must stop and wait their turns to cross the bridge. In the past, cars thus stopped before crossing the bridge have been struck from behind by HGVs, causing massive damage to multiple cars in addition to the fatalities and injuries mentioned above.

According to the EIS prepared for the Slane Bypass, for the period 1996 to mid-2009 there were 40 accidents in Slane involving either injuries or fatalities. (Other accidents caused material damage.) Among these were four fatal accidents, four serious injury accidents, and 31 minor injury accidents. The accidents were clustered on the N2 at Slane Bridge and the N2 / N51 junction; of the 40, 28% occurred at the Slane Bridge. Two of these accidents produced fatalities (50% of the total fatalities), and two resulted in serious injury (50% of the total serious injuries). At the N2/N51 junction, 30% of the 40 accidents in question occurred (the number of fatalities and serious injuries associated with these accidents could not be determined). At other locations on the N2, 40% of the accidents occurred, including one fatal accident at Fennor Cross, south of the bridge. Of all the 40 serious accidents, 30% involved trucks (which comprised between 10% and 16% of the overall traffic flow) (pp. 5-7, and 5-8, EIS).

Accident frequency has reduced considerably since enhanced traffic safety measures were installed in 2002, with just three minor injury accidents in the following seven years. Among these, however, was an accident that involved two large trucks and several small cars; it is only by the greatest good chance that no one was seriously injured or killed therein.

Solutions suggested by opponents of the current design to the traffic problem in Slane that do not involve construction of the bypass will be described elsewhere, under Sections 4 and 7. Also discussed in Section 7 will be the adequacy of studies that might have recommended these other solutions, as well as the adequacy of studies that predict impact on the World Heritage Site if the Bypass is constructed.



2. b Issues Raised by the Proposed Development

The area through which the proposed N2 Slane Bypass would be constructed is one of the most archaeologically, historically, scientifically, and aesthetically important regions in not only Ireland, but also in Europe and the world. Many extremely important archaeological sites are within the Brú na Bóinne World Heritage Site. Even more significantly, these occupy a coherent cultural landscape in which 7,000 years of human cultural change, adaptation, and innovation can be traced. It is clear that the landscape was contrived in ancient times in ways intended to induce awe and thereby to inculcate the social and ideological order it represents to those who pass through it. This is highly relevant to the outstanding universal significance of the site, which qualified it for inscription of the World Heritage List, and is discussed in more detail later in this report.

The bypass would be located approximately 500 meters from the World Heritage Site buffer zone at its closest point (see Figure 1). Given that proximity, there is concern among many organizations and individuals interested in the preservation of cultural sites that the bypass could produce both direct and indirect negative effects on the values that have qualified Brú na Bóinne for inscription on the World Heritage List. These are discussed below. There is also concern that the development will impact in a negative way other extremely important sites and landscapes that are outside of the World Heritage Site boundaries and buffer zone, but are closely related to the World Heritage Site historically, environmentally, aesthetically, and culturally.

To be inscribed on the World Heritage List, a site must meet at least one of 10 criteria that have been established by the World Heritage Committee (see Appendix 1) and must possess “outstanding universal value.” Brú na Bóinne was inscribed in the World Heritage List because it satisfies three of the ten criteria. These are:

- i. To represent a masterpiece of human creative genius;
- ii. To bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;
- iii. To be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;

Without a doubt, the outstanding universal value attached to Brú na Bóinne is largely attributable to the ambiance there, which is integral to all three criteria above. That ambiance is created by the totality of sights, sounds, and other sensory input presented to a person in the landscape. At issue here is how the introduction of modern infrastructure near the World Heritage Site would affect the experience of being in and passing through the landscape of the World Heritage Site. Some modern infrastructure features are all ready present, which must be taken into consideration. The question then arises, how does the introduction of the N2 Slane Bypass tip the scales in the balance of acceptable vs. unacceptable intrusions into the ancient landscape?



Sights and sounds associated with the world of today alter the setting devised by the ancient inhabitants, which both reflected and shaped the belief system and social order of their times. The periods in questions are, by virtue of the nomination dossier, both the Neolithic and the medieval. It is important to note that the effects in question could be both direct (those that would be perceived immediately if the proposed bypass is constructed, or that might degrade the outstanding universal value as associated with Brú na Bóinne in any other way) and indirect (further development facilitated by the construction of the proposed bypass that would introduce elements in the landscape that are incompatible with the values that qualified Brú na Bóinne for inscription on the World Heritage List, or that would degrade them).

This will be discussed in more detail under Section 7, Topic by Topic Assessment of the Key Impacts.

2. c. Possible Consequences to Brú na Bóinne World Heritage Site Status

Failure to maintain the outstanding universal value of a World Heritage Site can threaten its status as such. At the decision of the World Heritage Committee, an inscribed site that is judged to have lost its outstanding universal value can be removed from the World Heritage List. Alternately, a World Heritage Sites that is seen by the World Heritage Committee to be in danger of loosing its outstanding universal value can be placed on the List of World Heritage in Danger. The procedures for this are described in the UNESCO Operation Guidelines for the Implementation of the World Heritage Convention, paragraphs 192-198 for delisting and paragraphs 177-191 for placement on the List of World Heritage in Danger.

3. Summary of Conditions Within the World Heritage Site and in the Environs

The landscape within the Brú na Bóinne World Heritage Site is as impressive and evocative as that of any of the premier World Heritage archaeological sites and landscapes, including Machu Picchu, Petra, and Angkor. They, like Brú na Bóinne, are among the few that provide truly breathtaking vistas, which produce a sense of awe that undoubtedly played a central role in establishing and maintaining order among the ancient societies that inhabited those landscapes. Because the views from most locations within Brú na Bóinne, particularly at the key monuments, are broad ones that take in many other key cultural features – or, in the case of the River Boyne and the lush, green vegetation that covers surrounding hills, seemingly timeless natural ones – the visitor to the site is able to share this sense of awe.

Monumental architecture is found on all continents, with the exception, so far as we know, of Antarctica. Monumental architecture is strongly associated with the adoption of agriculture as the primary economic basis for a society. There are almost no examples of monumental architecture constructed by societies in which hunting and gathering are the primary means of human survival. Poverty Point, in the State of Louisiana in the United States and Silver Hill in England are two sites that offer exceptions to this rule, and so they are regarded as truly remarkable.



Archaeologists are in general agreement that monumental architecture was a way to assign roles and coordinate activities in societies that were becoming increasingly complex. Hunting and gathering can be done by small groups. In virtually every hunting and gathering society that has ever been studied, people take pains not to claim formal leadership. These societies are termed *egalitarian* because a person who is good at something will take the lead in that activity (tracking, for example), and someone else will lead in an activity in which they excel (e.g., making tools). When an animal is killed, the meat obtained is distributed throughout the small group, the band, to which the hunter belongs. Often, the hunter will not even receive one of the larger portions of meat.

When people began to practice agriculture, populations increased, labor categories were more formally defined and assigned, and formal leaders emerged. Creating field systems, managing hydrology, planting crops, weeding, keeping animals away from plants and predators away from animals grown or husbanded, and harvesting require the coordination of specialized activities according to a strict schedule.

Monuments can be regarded as tools for assigning and scheduling work. In agricultural societies and other sorts of complex societies, some people must plan and schedule requisite activities, and others must be motivated to carry them out. Monuments invariably include a space where only certain people are allowed. This might be simply a platform atop an earthen mound, or an area as elaborate as the inner sanctum of a temple. The people and groups of people who are allowed in such small, special places are those that plan and schedule. Most people will gather in much larger areas within or near the monuments. They are spectators, and might also participate in ritual behavior. In either or both cases, they are affirming their position in the societal order. Further, the rituals that take place at monuments often signal a new round of activities, such as planting, cleaning irrigation canals, or harvesting. Rituals also justify the distribution of food and desirable material objects, which is not equally shared as was the case in egalitarian societies. The leaders of society get more than other do other people in complex societies. Finally, they reinforce the power of the leaders.

This allotment of space to certain groups is known as *space syntax* in archaeology. The relationships among spaces provide meaning just as do the relationships among words (syntax). Therefore, groups of monuments are superior in conveying an intended message than are individual monuments. They form a monumental landscape. The landscape acts to justify, or as it is usually termed in archaeology, *legitimate* the position of the leadership. As noted, this is necessary for two reasons: The first is to justify the disproportionate share of food, desirable materials and goods that leaders enjoy, and the access that they have to the labor of others. Secondly, the power of the leaders must be bolstered periodically or they won't be able to coordinate the activities of those in the rest of the society effectively.



The landscape typically legitimates the position of the leaders in two ways. The first is by portraying the leadership of the societal elite as an aspect of the natural order of things, the order created by the gods that ultimately govern the world and so are worshiped by the people in the society. The natural order can most readily be seen in the cyclical movement of heavenly bodies: the sun, the moon, and the stars. Priests in agricultural societies typically have made a great study of this, and so can predict the point on the horizon where these heavenly bodies will appear as the year goes on. This is arcane knowledge that is available to only a few. It deals with the realm of the gods who created the world, which virtually all human groups have imagined to be above the earth.

Brú na Bóinne provides an outstanding example of a monumental landscape. The Neolithic passage tombs were constructed so that the rays of the sun would shine in the inner sanctum at the equinox and at the solstice. Those who occupy that space are linked to the realm of the eternal, the implication being that the power that the deceased once enjoyed has rightfully passed to members of the family or groups to which the deceased belonged. The leadership in this way is presented as being ordained by the gods.

The second way that the monumental landscape legitimates the social order is by generating a strong emotional response from those who participate in the rituals that take place at the monuments, whether or not they are not provided access to the inner sanctum. Emile Durkheim, often referred to as the father of modern social science, called this intense, shared emotional response *sentiment*. Sentiment produces a feeling of societal oneness, even if the rituals also underline differences in role and status. Further, as anthropologists who have studied initiation and other rituals have noted, the more intense the emotional response, the more likely that what is said will be remembered and internalized, accepted as a pattern for future behavior. Rituals include all manner of activities that intensify emotional response. Among those that occur in one place or another are: singing, chanting, praying, games, feasting, drinking, and even bloodletting. The monumental landscape itself also induces a strong emotional response, typically something akin to awe.

The experience of seeing the Acropolis in Athens, hovering over the city; the view of Machu Picchu as one approaches along the Inca Trail; or the sudden appearance of Al-Khazna at Petra as one rounds the final corner of the narrow rock canyon called the Siq all evoke feelings of awe. The landscape at Brú na Bóinne, which some have suggested was usually first seen as one approached along the River Boyne, evokes an emotional response no less intense. Yet there is an important difference: here, the material from which the monumental landscape of Brú na Bóinne constructed was not masonry, it was the earth itself, covered with the lush, green vegetation for which Ireland is renowned. To introduce contemporary elements in that field of green is to lessen to some degree the emotional response that it produces. A visitor today would then be deprived of the full understanding of what the landscape meant to the ancient inhabitants of the Bend of the Boyne and how it worked to create and maintain ancient societies.



There are, in fact, elements in this landscape that jar the viewer, that distract the visitor from the sense that he or she is immersed in an ancient – in some ways, timeless – world. Among these are the electrical power lines that were installed before the World Heritage Site was established. Some intrusive landscape elements, however, were introduced after the 1993 inscription of the site.

An important issue here, then, is this accretion of intrusive elements, and the point at which the contemporary world is so much in evidence that the experience of viewing the landscape from within the World Heritage Site, which is integral to the outstanding universal value of the site, is compromised to the extent that it becomes less than outstanding.

3. a. Cumulative Impact of Intrusive Elements on the Landscape

Among these are:

The construction of the M1 motorway and a bridge that crosses the River Boyne just outside of the eastern edge of the buffer zone of the WHS

Though outside the buffer zone, the road and bridge have introduced visual and aural elements to the eastern portion of the World Heritage Site that are impossible to ignore. Certain informants report that the M1 Bridge is visible from certain locations at both Knowth and Dowth. The bridge dominates the skyline from the Battle of the Boyne Visitor Center, which is located just to the east of the core area of the World Heritage Site. Much of the Battle of the Boyne was fought within the boundaries of the World Heritage Site.

In addition to the three most prominent Neolithic monuments, there are approximately 40 smaller ones. Although viewshed analyses have not been done from the smaller monuments to the M1 Bridge, it could be visible from some of them, as well from medieval monuments that contribute to the outstanding universal value of Brú na Bóinne.

The main text of the nomination dossier for Brú na Bóinne did not mention the proposed M1, although an attached study did. Two years after inscription, the EIS prepared for the motorway made no mention of the possible impact on the World Heritage Site, or the possibility that the motorway might endanger the inscription.

The 2004 mission stated:

In the mission's opinion it would have been appropriate for the State Party to have drawn the attention of the World Heritage Committee to this proposed major piece of infrastructure and to have confirmed whether or not it would have had an impact on the outstanding universal value of the World Heritage site.

The M1 Bridge is especially problematic. Although there is anecdotal evidence that it's interesting, contemporary design is liked among the general public, the bridge is

an unavoidable element in the landscape as seen from the western portion of the World Heritage Site, and from certain points within the eastern portion of the World Heritage Site as well. While it is of a design that many find attractive, it is without a doubt incompatible with the Neolithic and medieval landscape elements that led to the inscription of Brú na Bóinne. (Interestingly, it is located approximately where William of Orange led his troops across the river at the Battle of the Boyne).

A cement factory on the skyline to the east south-east of the World Heritage Site

This factory, located near Duleek, was constructed before 1993, but its impact on the landscape has become more evident over the past three years. Before that time, there were two chimneys with red lights (labeled 2 and 3 in Figure 2), and about three years ago, a third chimney and a scrubber was added (labeled 4 and 5). This produced a mass visible during daytime; at night, it is even more distracting, being brightly illuminated. There was apparently no discussion of visual impact on the World Heritage Site when the third stack was added.

Incinerator, Carranstown

The stack for the incinerator is labeled 7 in Figure 2. The proposal for the incinerator gave rise to a reactive monitoring mission in 2004, which judged that it, in itself, was not enough of an intrusion to negate the outstanding universal value of Brú na Bóinne



Figure 2 Some Intrusive Features on the Bru na Boinne Landscape



Housing developments

New housing construction has taken place that is very visible from within the World Heritage Site (labeled 8 in Figure 2), and even more visible from the Hill of Slane. As discussed below, were the proposed bypass to become a reality, the unimpeded and therefore quick access to Dublin from Slane might encourage the further development of Slane not as an historic area, but as a bedroom community to Dublin. As such, it is

likely that additional housing and related developments would introduce elements with a contemporary appearance into the viewshed from the World Heritage Site

It should be noted here that such development would also be very visible from the Hill of Slane. While the Hill of Slane is outside the World Heritage Site, as a signatory to the World Heritage Convention, Ireland has indicated its commitment “To ensure that effective and active measures are taken for the protection, conservation and presentation of the cultural and natural heritage situated on its territory,” according to Article 5 of that Convention.²

Mineral (limestone) exploration

² UNESCO World Heritage Convention, Article 5:

To ensure that effective and active measures are taken for the protection, conservation and presentation of the cultural and natural heritage situated on its territory, each State Party to this Convention shall endeavor, in so far as possible, and as appropriate for each country:

1. to adopt a general policy which aims to give the cultural and natural heritage a function in the life of the community and to integrate the protection of that heritage into comprehensive planning programmes;
2. to set up within its territories, where such services do not exist, one or more services for the protection, conservation and presentation of the cultural and natural heritage with an appropriate staff and possessing the means to discharge their functions;
3. to develop scientific and technical studies and research and to work out such operating methods as will make the State capable of counteracting the dangers that threaten its cultural or natural heritage;
4. to take the appropriate legal, scientific, technical, administrative and financial measures necessary for the identification, protection, conservation, presentation and rehabilitation of this heritage; and
5. to foster the establishment or development of national or regional centres for training in the protection, conservation and presentation of the cultural and natural heritage and to encourage scientific research in this field.



The 2004 reactive mission document registers concern about licenses for mineral extraction in the northeast portion of the inscribed area and in most of the buffer zone. There is in fact one location within the World Heritage Site where limestone is being extracted.

4. Statement of Outstanding Universal Value

Brú na Bóinne represents an area of “outstanding universal significance” on a number of different levels:

- i) The quality and quantity of the collective megalithic art of the area represents a “unique artistic” and aesthetic achievement that is unequalled by its counterparts throughout the rest of Europe;
- ii) The monuments of the area display longevity of settlement, whose origins are found in Neolithic settlements of “great antiquity;”
- iii) The various monuments, particularly the great passage tombs, represent “important cultural, social, artistic [and] scientific” developments over a considerable length of time. Nowhere else in the world can one find the continuity of settlement and activity associated with a megalithic cemetery such as that which exists at Brú na Bóinne;
- iv) The passage tomb complex represents a spectacular survival of the embodiment of a set of ideas and beliefs that otherwise might have been lost to the world.

NB: The outstanding universal value of Brú na Bóinne is linked not only with the Neolithic monuments there, but includes all monuments in the World Heritage Site, which testify to the “longevity of settlement” and provide the basis for the remarkable statement that, “Nowhere else in the world can one find the continuity of settlement and activity associated with a megalithic cemetery such as that which exists at Brú na Bóinne.”

5. Details of How the Alternatives to Changes are Being Considered

Solutions to the traffic problem in Slane Village that do not include the construction of the Slane Bypass have been suggested by almost every stakeholder and stakeholder group that resides outside the village of Slane and has offered an opinion. These opinions were expressed in the written submittals during the EIS consultation process and during the interviews conducted during research for this report.

Residents within the village of Slane are living under the proverbial sword of Damocles, and are understandably anxious for an effective solution to the traffic problems there. The issue properly framed, however, is not whether or not the traffic



problem in Slane should be corrected, but rather how that can be done without further impairing the outstanding universal value that inheres in the World Heritage Site.

Beyond the very real threats that the traffic situation in Slane presents to the safety and well-being of the town's residents, the traffic problem seems to have exacerbated the sense of alienation from the World Heritage Site felt by the inhabitants of Slane. Another contributing element to that alienation is the construction of a related visitor center outside of Slane. Residents of Slane feel that this was detrimental to the town's economic well-being. Undeniably, those in the neighborhood of Slane who reside within the core and buffer zone of the World Heritage Site are restricted in the activities and improvements that they can carry out on their property. A sense exists among the community that the presence of the World Heritage Site only obligates them to attend to issues and adhere to regulations that do not apply to people living farther away from the World Heritage Site. At the same time, they have realized little benefit from living close to the World Heritage Site. Under these conditions, it is easy to understand why objections to the proposed N2 Slane Bypass might appear to be yet another unreasonable restriction on the choices available to the community.

5. a. Solutions to the Slane Traffic Problem Offered by Stakeholders With Concerns About the N2 Slane Bypass

Two solutions to the traffic issue in Slane that do not involve construction of a bypass around Slane are frequently heard from stakeholders who do not reside in Slane. These are: 1) the imposition of a ban on HGVs in Slane; and 2) diverting HGV and other traffic away from Slane, particularly by way of the N33 north of Slane, which connects to the M1.

A Ban on HGVs

A short-term ban on HGVs was, in fact, imposed by the Meath County Council, but was never enforced. A report was written by Eugene Cummins, Director of Services, and Infrastructure for the Meath County Council, dated 6 July 2009 that raised a number of objections to the ban made by the President of the Irish Road Haulage Association were listed there, as follows:

- A ban would result in longer journey times and additional costs for Haulage Association Members
- Alternatives to the ban should be considered, including ramps, traffic lights, and high speeding surfaces
- The banning of HGVs could compromise the case for a bypass
- The nature of modern truck braking systems is misunderstood by the public, in that all trucks now have mechanisms that immobilize them when the brakes fail



- Measures to control speed (and their enforcement) might be more appropriate than the HGV ban

The report recommended a study that would address the following issues:

- The extent of the ban – whether in effect only on the N2 or also on the N51
- Whether the ban should be in effect only at peak traffic times or all of the time
- The mechanism to introduce the ban – whether it should be a by-law or a cordon type of arrangement, as obtains at the Quays in Dublin
- How the ban would be administered
- How the ban would be enforced, including enforcement on vehicles from outside the state
- The implications and effects the HGV ban would have on other local authorities and state agencies outside of County Meath
- Identification of suitable diversion routes
- Design and signage issues
- Consultation with other authorities and affected parties
- Socio-economic impact on Slane and the local area

The report concluded that:

The banning of HGVs in Slane would have national and international implications and if implemented could have serious consequences for Meath County Council in terms of possible legal exposure, delivery delays, and business frustration. This could be applied to other affected local authorities, agencies, and bodies. As it is the general duty of the NRA, under Roads Act, to secure the provision of safe and effective network of roads it is considered the responsibility of the NRA to have the above mentioned study carried out in order to ascertain the full impacts that such a ban would have on Slane, the County in general, and settlements and infrastructure in other jurisdictions.



It should be noted that Meath County Council is fully supportive of a HGV ban in the village and is willing to work with the NRA in the implementation of whatever proposals that emerge from the study.

A search has not found any reports based upon such studies. As the ban was considered to be a stop-gap measure until the N2 Slane Bypass could be constructed, it has not been enforced to date

A presentation was made on 15 February 2011 at the oral hearings the N2 Slane Bypass by Seamus Mac Gearailt of Roughan & O'Donovan Consulting Engineers in which a slide was shown indicating, "Only 15% of total 1,460 trucks per day across Slane Bridge is long-distance N2 traffic." This figure was apparently generated from data that was not previously made available to the public, and is at present in the form of approximately 30 pages of data collected by means of a HGV driver survey.

Directing Traffic Away from the N2 in the Area of Slane

The second commonly offered alternative to constructing the Slane Bypass, offered, for example, in written submittals to the planning process, is to direct traffic away from the N2. A search for studies examining the feasibility of this has not found any. Objections to this scheme are anecdotal. In conversation, it is often observed that trucks and other vehicles use the N2 through Slane because there are tolls on the M1 and M3, and because the M1 is congested. While the N33 was built to direct traffic from the N2 north of Slane to the M1, it is said, traffic does not flow this way because of the combined influence of the tolls and congestion. There seem to be no formal traffic flow studies to support or deny this, however, nor any documents that consider how tolls could be adjusted and traffic congestion on the M1 relieved to so that more or most drivers would make the choice to utilize the N33 and the M1.

Many who offered written submittals during the planning process or among those interviewed for this report suggested imposing different toll rates, with more charged to through traffic (for example, traffic from Derry) than to local traffic, or charging tolls to through traffic and not charging local traffic. Traffic in this way would be shunted via east-west spur roads away from the N2 and well north of Slane, to the M3 and M1. This would occur well outside the World Heritage Site buffer zone area.

Opponents of the N2 Slane Bypass noted that the preferred Dublin-Derry route is already the M1 to the Ardee N33 junction north of Drogheda, and then to the N2 Ardee bypass. A similarly improved road could be provided to link the N2 to the M3 north of Slane. Following this, HGVs could be banned from entering Slane without a special permit. Height restriction barriers could also further deter traffic. All other traffic entering Slane would be slowed to the point where commuters would be inclined to use the M1 and M3, rather than Slane Bridge, to commute to and from Dublin. Whether or not this or similar schemes would be successful can not be ascertained in the absence of appropriate studies.



A number of informants suggested that constructing the Slane Bypass as currently proposed, with no tolls, would entice even more vehicles to use the N2 as opposed to the M1 and M3, which are both tolled. Opponents of the N2 Slane Bypass point out that given that the private company that operates the M3 is now suing the government of Ireland for 100,000 Euros because the road is not attracting the number of vehicles that had been anticipated, it seems possible that, quite aside from the possible increased environmental impact of increased traffic flow through the vicinity of Slane, the government might open itself to further lawsuits.

A presentation was made on 15 February 2011 at the oral hearings the N2 Slane Bypass by Seamus Mac Gearailt of Roughan & O'Donovan Consulting Engineers in which several slides were shown that briefly discussed alternate routes that might obviate the need for the N2 Slane Bypass, under the general heading of, *Traffic Management as an Alternative to a Bypass?* While a number of impediments to traffic management approaches were noted, these appeared not to be based up previous studies. Among the obstacles noted to a traffic management approach was, "It is outside the scope of this project to consider wider tolling policies on the national motorway network."

6. Methodology and Terms of Reference

The scope of this project, which is described as, *The Provision of Heritage Impact Assessment for the N2 Slane Bypass*, in the Conditions of Engagement between the Meath County Council and Cultural Site Research and Management, Inc., is to produce an assessment of the likely impacts of the proposed Slane Bypass on the outstanding universal value of the world heritage site at Brú Na Bóinne. This is to be done as described the draft ICOMOS document "Guidance on Heritage Impact Assessments for Cultural World Heritage Properties."

Prior to the field visit (i.e. meetings with stakeholders, examining the landscape and features within the Brú na Bóinne World Heritage Sites and at related sites, etc.), pertinent documents were examined, including project drawings and descriptions, studies conducted prior to design, the Environmental Impact Statement (EIS), and press clippings. After arrival onsite, meetings were held, as listed below under "Organizations and People Consulted." Many other pertinent documents were also collected during the site visit, including submittals made as part of the EIS process. Notes taken by hand during those meetings were transcribed, and electronic versions were sent to all people and organizations interviewed. The interviewees returned the notes with corrections, clarifications, and elaborations. Several drafts (at 50%, 75%, and 80%) were submitted to Regan, McEntee, and Partners for comment and as means to request calcification, new information, or direction to existing information. Finally, the author listened to testimony during the first week of public hearings, This report was then prepared.



7. Organizations and People Consulted

Wednesday 19th January

Rory McEntee, Solicitor, Regan McEntee & Partners Solicitors

Seamus Mac Gearailt, Chartered Engineer, Roughan O'Donovan Consulting Engineers

Declan O'Leary, Director, Cunnane Stratton Reynolds, Land Planning & Design

Finola O'Carroll, Archaeologist, CRDS Ltd

Nicholas Whyatt, Senior Engineer, Meath County Council

Pat Gallagher, Senior Planner, Meath County Council

Maurice Kelly, Senior Executive Engineer, Meath County Council

Maura Daly, Executive Engineer, Meath County Council

Niall Rycroft, Archaeologist, National Roads Authority

Thursday 20th January

Gabriel Cooney, Professor of Celtic Archaeology and Head of School of Archaeology, University College Dublin

Brian Duffy, Chief Archaeologist, Department of Environment, Heritage & Local Government

Gerry Browner, Senior Architect, Heritage Policy & Architectural Protection Section, Department of Environment, Heritage & Local Government

John Ducie, Property & Conservation Officer, An Taisce

Mark Clinton, An Taisce

Patrick F. Wallace, Director, National Museum of Ireland

Padraig Clancy, Assistant Keeper, National Museum of Ireland

Ronan Swan, National Roads Authority



Friday 21st January

Geraldine Stout, Expert on Brú na Bóinne, Department of Environment, Heritage & Local Government

Clare Tuffy, Manager, Brú na Bóinne, Office of Public Works (OPW)

Ana Dolan, Senior Conservation Architect, National Monuments Service, OPW

Conor Brady, Lecturer in Archaeology, Dept. of Humanities, Dundalk Institute of Technology, Bypass Slane Campaign

Ronan Swan, National Roads Authority

Niall Rycroft, Archaeologist, National Roads Authority

John Clancy, Meath Archaeological & Historical Society

Saturday & Sunday 22nd & 23rd January

John Ryle, Local Resident, Secretary, Slane Bridge Action Committee

Michele Power, Local Resident, Bypass Slane Campaign

Niamh O'Broin Bypass Slane Campaign

Wayne Harding

Ciaran Baxter (Slane Forum)

John Rogers, Senior Counsel, Local Resident

Joseph P. Fenwick, Department of Archaeology, National University of Ireland, Galway (Telephone interview)

George Eogan, Professor Emeritus

Monday 24th January

Ian Doyle, Head of Conservation Services, Heritage Council

Will Megarry, Researcher on Boyne Valley GIS Project, University College, Dublin



Stephen Davis, Researcher on Boyne Valley GIS Project, University College, Dublin

Conor Brady, Lecturer in Archaeology, Dept. of Humanities, Dundalk Institute of Technology, Bypass Slane Campaign

Elene Negussie, ICOMOS Ireland

Patrick Shaffrey, ICOMOS Ireland

In addition, several emails were sent to the author expression a variety of opinions. Names are not presented here as permission from those who sent the emails has not been obtained.

8. Topic by Topic Assessment of the Key Impacts

8. a. Details of Baseline Condition

The heritage value of the landscape at Brú na Bóinne is very high, as is the value of many, if not most of, the sites and features that are contained within that landscape, from Neolithic passage tombs to medieval ring forts and souterrains. The landscape also played a crucial role in historical events; though it might not have left a visible footprint in these cases, it in many ways shaped the course of history. Very unusually, then, it can safely be evaluated as possessing a very high value in terms of not only archaeology, but also built heritage, historic landscape, and intangible heritage and associations.

There are 12 periods of history represented within Brú na Bóinne. The earliest five of these are:

Initial Early Neolithic c. 4,000-3700 BCE

Developmental Early Neolithic c. 3700-3500 BCE

Passage Tombs c. 3500/3303-2700 BCE

Grooved Ware c. 2500-2200 BCE

Beaker Culture c. 2200-2000 BCE

Following this, there was a very interesting period from about 2000 BCE to 0 CE when the Bend of the Boyne area seems to have been unoccupied. Perhaps it was regarded as a sacred area, to be avoided, though it might also have been used to graze sheep.

There are many passage tombs in addition to the very well known ones at Knowth, Dowth, and Newgrange. A major tomb that has been so disturbed as to largely merge into the landscape is Ballmeral. Associated with the major passage tombs are many smaller ones: at Knowth, 20; at Newgrange, four; at Ballmeral, three; and at Dowth, one, though the area surrounding Dowth has



not been fully investigated. In addition to these, there at least six other small passage tombs within Ireland.

From about 432 to 1169 CE (the early medieval period), the petty kingdom of Brega occupied an area that roughly corresponds to that now occupied by County Meath. In the late sixth and early seventh centuries, the Áed Sláine dynasty rose to become the high kings of Ireland. The center of the dynasty was located at or near the passage tomb at Knowth. Small farmsteads, marked by what are now called ring forts, are associated with this time period. These can be seen at Newgrange as well as at Knowth.

Thereafter, souterraines (subterranean refuges with dry stone walling, capped with large stone lintels) were constructed in the area. Among the reasons for their construction might have been raids by the Vikings, who came up the River Boyne from the sea.

As Christianity was adopted in Ireland, major political and economic changes took place. At this time, the kingdom of Northern Brega emerged. The area occupied by Northern Brega roughly corresponds to that occupied by northern County Meath today. Many important artifacts are associated with this kingdom, including the Book of Kells and high crosses. There were more monasteries and high crosses in North Brega than in South Brega. For example, Monasterboice, where the finest high crosses in all of Ireland can be found, was in North Brega, and magnificent ninth century high crosses can still be seen there. Kells and Monasterboice were recently placed on the World Heritage Tentative List for Ireland as Early Medieval Monastic Sites.

The early Irish historian Francis Byrne thinks that a chapel or ecclesiastical center for Knowth was located on the Hill of Slane during the time that the Áed Sláine dynasty was in power. This would constitute a very clear connection between the two high points, one that emphasizes the desire to maintain unmarred inter-visibility between the two places. In post-dynastic times, the kings of North Brega might have used it as a chapel.

The well-known legend states that at the Hill of Tara, a High King (perhaps King Laoghaire) issued a proclamation that no one was to light a fire on his birthday before he had lit his. Saint Patrick lit his Pascal Fire on the Hill of Slane, and when the King and his entourage came to investigate, St. Patrick delivered a sermon that explained the Trinity using references to a shamrock. Whatever its basis in fact, this story is strongly associated with the historical reality of the introduction of Christianity to Ireland and Northern Europe. Tara is on the World Heritage Tentative List for Ireland as one of the Royal Sites of Ireland.

What is remarkable about all that is described above in this section is that these features, both inside and outside the World Heritage Site, are



interrelated, and form a continuous history that stretches over approximately 6,000 years. It is against this baseline that any change must be evaluated.

8. b. Consideration of Non-Significant Potential Effects

As noted in Section 2, Summary of Conditions, there have been a number of intrusive developments already in and near the World Heritage Site. While these are extremely regrettable, they have not, as of yet, marred the outstanding universal value of the Brú na Bóinne site sufficiently to threaten its standing as a World Heritage Site. Yet the building of a road near or in a World Heritage Site is among the most problematic of all possible developments because a new or improved road inevitably changes the existing ecological and social dynamics of the area through which it passes and in nearby areas. A road provides greatly enhanced access, and excessive access to sensitive cultural and natural areas can destroy them. When considering the effects that would arise from the construction of the Slane Bypass, none can be viewed as non-significant.

8. c. Consideration of Significant Potential Effects

- i. Visual impact** (negative) is described in a number of Slane Bypass planning documents; however, visual analyses are minimal in considering impact to areas within the World Heritage Site itself. The EIS reports on views from 13 areas, including Newgrange, Knowth, Dowth, and the Visitor Center, but most are near to Slane, Visual intrusion will be greater along the River Boyne. Also, given the terrain, it is possible that the analytical devices used in viewshed analyses are not precise enough to predict all viewshed infringements.
- ii. Noise impact** Modeling for noise impact from the proposed N2 Slane Bypass indicates that noise levels will not change much from what they are at present within the World Heritage Site.
- iii. Archaeological resources** Archaeological deposits within the World Heritage Site would not be affected by the proposed N2 Slane Bypass. Concerns have been raised that archaeological resources might be located within the area to be disturbed by road and bridge construction, as indicated below.
 1. There is a likelihood of important sites and features
 2. Unless survey techniques are designed with this in mind, sites and features might be destroyed or partially destroyed, and non-structural remains (e.g., lithic scatters) might not be adequately recorded. Such archaeological remains might be related to those inside the World Heritage Site.



- iv. Spiritual values** (negative) The monuments within Brú na Bóinne represent a transition from an ancient and indigenous belief system to an institutionalized cult, and thence to the world religion of Christianity. The introduction of modern features in the vicinity of the monuments impairs the understanding on the part of the contemporary visitor of the emotional response that imparted such spiritual values to ancient populations and to the modern-day adherents to these belief systems. (This statement does not imply the endorsement of any set of religious views, but only acknowledges that the monumental landscape at Brú na Bóinne evokes a sense of awe in most that are perceived as confirmation of religious belief by some.)
- v. Indirect impact** (negative) The possibility that the bypass may serve as a catalyst for future development near the World Heritage Site, or within the buffer zone or core of the World Heritage Site, is not considered in any planning document developed for the N2 Slane Bypass project. At meetings with Meath County Council planners on 16 February 2011, statements were made that national, regional, county, and local planning documents effectively eliminated this possibility. Among other things, Slane has been designated as a no-growth area, and much of the vicinity of Slane is zoned for agricultural use. Yet, zoning can be changed, and with that in mind, the following observations are made:
1. If a fast, safe route from Slane to Dublin is established, there will be great incentive for the development of more housing and structures that will provide services to residents and travelers passing through Slane, especially when economic conditions improve.
 2. New construction is usually not compatible with the ambiance essential to maintaining the outstanding universal value for which historic and prehistoric sites and landscapes are inscribed on the World Heritage List.
 3. The 2004 reactive monitoring mission noted that the original World Heritage Site nomination dossier states that:

Conservation Measures (Protective, Legal, Administrative): In addition to the protection of the monuments under the National Monuments Acts as outlined above, the Core Area and Buffer Zones are defined as special Areas of archaeological Interest in the Meath County Council (Planning Authority) County Development Plan established under the Planning Acts in 1989 (see also appendix 9). A stated objective of the Development



Plan is the protection of these areas from undesirable development. In effect, this ensures that further development does not take place in the Core Area and that development in the Buffer Zones does not prejudice the management of the resource (e.g. views, access, archaeology) The State Agency directly responsible for the management of the archaeological resource, the Office of Public Works, is consulted regarding all planning applications in the area and has the opportunity to object or to insist on conditions to be attached to planning permissions. (Appendix 3, pp. 11-12)

- i. The third sentence (“In effect, this ensures...”) was particularly emphasized in the ICOMOS evaluation report, but, as the mission saw on its visits, development has taken place both within the core area and the buffer zone, some of it intrusive.
- ii. The mission received conflicting opinions on the effects of this development, ranging from the view that the inscribed area was rapidly being devalued, to the point where continued inscription should be questioned, to the view that the local community, whose applications are “not discouraged by successive development plans, are faced with objection from the state, even for individual family homes.” In the vein of this latter view, it was expressed to the mission that, while strategically significant infrastructure projects were granted permission; smaller scale proposals of importance to local residents were being refused.

vi. Authenticity (negative) In the version of the Operational Guidelines adopted in 1980, it is stated that, in order to be of outstanding universal value, a cultural property must meet one or more of the six specified criteria, and also meet the test of authenticity.

1. Authenticity is evaluated in terms of design, materials, workmanship, or setting. (The Committee stressed that reconstruction is only acceptable if it is carried out on the basis of complete and detailed documentation of the original, and to no extent relies on conjecture).
2. Authenticity at Brú na Bóinne, therefore, lies in the unarguable authenticity of its setting.³

³Meath County Development Plan, Page 335:

8. d. Scale and Severity of Impact and the Significance of Effect or Overall Impact. The scale and severity of impact is used as a basis for assessing the significance or effect or overall impact, as indicated in the chart below, taken from *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS, January, 2011) (The heritage asset value of Brú na Bóinne is *Very High*):

VALUE OF HERITAGE ASSET	SCALE & SEVERITY OF CHANGE/IMPACT				
	No Change	Negligible change	Minor change	Moderate change	Major change
For WH properties Very High – attributes which convey OUV	SIGNIFICANCE OF EFFECT OR OVERALL IMPACT (EITHER ADVERSE OR BENEFICIAL)				
	Neutral	Slight	Moderate/ Large	Large/very Large	Very Large

Within the World Heritage Site, the assessment of development proposals must also adhere to other policies contained in the Development Plan relating to the protection of the World Heritage Site, including the protection of views, prospects, archaeology and the protection of the heritage setting and amenities of the National Monuments in the area.

This will include *inter alia* an assessment of the following:

- There should be no inter-visibility between the development sites and the National Monuments of Newgrange, Knowth and Dowth, up to and including apex of roof level, and minimisation of inter-visibility between the development site and the other National Monuments sites;
- Existing protected views shall be retained;
- Development must not negatively affect the amenity, views, and landscape setting of the National Monuments, i.e. protecting all of the above;
- Extensive screen planting which would alter the landscape setting of the National Monuments will not in itself be considered as adequate mitigation, and;
- Development that would give rise to or exacerbate inappropriate clustering or ribbon development will not be permitted



- i. As described below, the N2 Slane Bypass would, based upon available information, constitute a *Major Change* and therefore a *Very Large Adverse Impact* if satisfactory assurances that the Bypass will not stimulate new construction in the vicinity of the World Heritage Site cannot be made.
- ii. If satisfactory assurances that the development will not stimulate new construction can be made, then the development would constitute a *Minor Change* and thus *Moderate/Large Adverse Effect on the condition that the N2 Slane Bypass is visible only from the top of Knowth, or a Moderate Change* and therefore *Large/Very Large Adverse Impact* if the N2 Slane Bypass is visible from several locations within the World Heritage Site. This assessment is based upon the indicator: “Considerable changes to setting that affect the character of the asset” (regarding intrusive sights). The proposed change, combined with intrusive elements that predate it, constitutes such a considerable change.

8.e. Appropriateness of Evaluative Methods Used and Study Areas Included

i. Viewshed The viewshed analyses in the EIS conducted from within the World Heritage Site were done for 13 viewpoints. The entire landscape is inscribed, and so consideration must be given to all of the inscribed area. Have any studies addressed this? For example, has the highly precise LIDAR image for the area been used to do this?

1. It is highly recommended here do a balloon test as well as to utilized digital modeling techniques. In fact, the balloon test can be used to check and calibrate the digital modeling techniques (for example, a balloon test of this nature http://www.airphotoslive.com/balloon_test.html).

ii. Other lacunae (additional studies and reports needed to evaluate impact)

1. Any studies or further documents and/or correspondence related to the report written by Eugene Cummins, Director of Services for the Meath County Council, dated 6 July 2009. This report provides a rationale for not implementing the HGV ban imposed by the Meath County Council. In doing so, it suggests that other studies should



be undertaken. Are there reports based upon these studies, and is there a decision document that revokes the HGV ban or discusses the reasons for delaying its implementation?

2. Any studies concerning the feasibility of directing traffic away from the N2 before the N2 passes through Slane. M1 and M3 are toll roads, and the N2 is not, so there is motivation for trucks and other vehicles to use the N2. This, though, begs the question – can the toll system be looked at from a broad scale and adjusted in ways that would direct traffic away from Slane? Overall, the question is, has this alternate solution been thoroughly studied?⁴
3. The raw data and the analysis of it that was the basis for the Any study that determines what percentage of HGVs passing through Slane represents those owned by local businesses, and what percentage are through-traffic trucks?
5. Any study that evaluates the probability that the Slane Bypass will encourage further development near the bypass and the World Heritage Site, and/or addresses how this scenario would be managed.
6. Any study concerning the addition a few years ago of the third stack to the cement plant visible from many parts of the WHS, and how it might affect conditions there.

⁴ On page 5 of the April, 2008 document, *N2 Ashbourne to Ardee Feasibility Study Report*, is indicated that 1) the proposed Slane Bypass would generate traffic levels far beyond those experienced near Slane today, and 2) a more refined traffic model is needed in order to determine how the N2 might interact with the adjacent, complementary routes M1 and M3, as well as with east-west routes that could carry traffic from the N2 to the M1 and M3:

The strategic Leinster Traffic Model has provided a useful indication that a dual carriageway type road is required for the N2 corridor in the long-term. Previously a traffic flow of 11,500 AADT was projected for the N2 Slane Bypass by 2023, which is at the capacity limit of a standard single carriageway. Revised forecasts have increased the projected traffic flow to 20,000 AADT in 2025, which would require a Type 1 dual carriageway to provide capacity for further growth beyond 2025.

However, the strategic traffic model results are open to question south of Slane, where the projected flows are surprisingly low. In addition, more information is required as to the interaction of the N2 route with the adjacent complementary M1 and M3 routes, and particularly for the intersecting N33, N51, R169, R152 and R153 routes. A more refined traffic model is therefore required to provide more detailed and robust future traffic projections for the N2 study area between Ashbourne and Ardee. This model should enable assessment of the capacity requirements for all routes within a study area extending from the M1 in the east to the M3 in the west and from the M50 in the south to the N52 in the north.



9. Calendar for the Development

Preparatory work, Background Reading and Familiarisation – December 2010 onwards.

WHS Expert to provide list of requirements to MCC in relation to information and assistance required to undertake the assessment. – 21st December 2010

Site visit and consultations – Jan 18th to 24th 2011

Report and Brief of Evidence to be delivered for use at Oral Hearing - Late February 2011 (subject to confirmation from An Bord Pleanála)



Appendix A

Curriculum Vitae

Douglas C. Comer, Ph.D., RPA

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Douglas C. Comer, Ph.D.

Douglas Comer is Principal, Cultural Site Research and Management, Inc. (CSR) (www.culturalsite.com). CSR operates in the United States, Europe, the Middle East, Southeast Asia, West Africa, South America, and Central America. Dr. Comer is also Co-President of the ICOMOS International Scientific Committee on Archaeological Heritage Management (ICAHM) (www.icomos.org/icahm) (with Prof. dr. Willem J.H. Willems, Leiden University). In that capacity, he oversees efforts to identify archaeological sites that might be likely to be eligible for inscription of the World Heritage List, to develop and propagate standards for the management of archaeological sites, to assist in the nomination of archaeological sites to the World Heritage List, to encourage dissemination of information about archaeological heritage management through publication and public outreach, and to facilitate collaboration among ICAHM Expert Members. Dr. Comer specializes in planning for the management and interpretation of archaeological sites and landscapes, and in the use of aerial and satellite remote sensing for archaeological research and resource protection. He is a recipient of National Science Foundation (NSF), Department of Defense Strategic Environmental Research and Development Program (SERDP), National Center for National Technology and Training (NCPTT), NASA, ESRI, Kaplan Fund, GeoEye, and other grants for the development of aerial and satellite remote sensing technology for use in archaeology, and has published extensively on that subject as it relates to archaeology and cultural resource management. Dr. Comer has been the Chief of the US National Park Service Applied Archaeology Center, a Fulbright Scholar in Cultural Resource Management, Chair of the Maryland Governors Advisory Committee on Archaeology, a Research Fellow at the Southeast Asian Center for Archaeology and the Fine Arts (SPAFA) in Bangkok and the American Center for Oriental Research (ACOR) in Amman, Chair of the Nominating Committee for the Register of Professional Archaeologists (RPA), and a Trustee for the United States Committee for the International Council of Monuments and Sites (ICOMOS). He is Conservation and Preservation section editor for the Encyclopedia of Global Archaeology.



EDUCATION:

- Ph.D., University of Maryland, American Studies (Material Culture, Archaeology) 1993
- MA. , University of Northern Colorado, Anthropology (Archaeology) 1975
- BA, Grand Valley State College, Anthropology/Psychology 1970

PROFESSIONAL EXPERIENCE

- Principal, Cultural Site Research and Management (CSRM), May, 1999 to present
- Chief, United States National Park Service Applied Archaeology Center, 1981 to May, 1999
- Archaeologist, United States National Park Service, 1976-1981

RELEVANT AWARDS AND GRANTS

- National Aeronautic and Space Administration (NASA) Research Opportunities in Space and Earth Sciences (ROSES) Grant: Automating and Enhancing Protocols for the Development of Signatures for Archaeological Sites Using Publicly Available NASA Imagery, 2008.
- National Center for Preservation Technology and Training Grant, Merging Aerial High Resolution Radar and Satellite Multispectral Data to Detect Archaeological Sites, 2005.
- National Science Foundation Research Grant, Use of Synthetic Aperture Radar for Discovery of Archaeological Sites in the Tropical Rainforest, 2004.
- Department of Defense SERDP Research Grant, Developing Protocols for the Application of Synthetic Aperture Radar to the Inventory of Archaeological Sites, 2002.
- Kaplan Fund, Transfer of Technology from the Department of Defense to the Archaeological Community, 2000.
- American Center of Oriental Research Grant, Three-dimensional Landscape Analysis of Beidha, in Southern Jordan, 1999.
- ESRI Training Mission Grant, Ghana, Africa, 1998.
- Kaplan Fund Grant, Analysis of Petra, Jordan Radar Imagery, 1997.
- National Center for Preservation Training and Technology Grant, Aerial Photography in TROPICALLY Vegetated Environments, 1996.
- Fulbright Senior Professional Scholarship for Lecturing and Consultation (Cultural Resource Management), Thailand, 1994.

POSITIONS

- Editor, ICAHM Springer Publication Series
- Section Editor, Conservation and Preservation, the Encyclopedia of Global Archaeology
- Co-President, International Council on Archaeological Heritage Management



- (ICAHM), 2009-Present
- Chair, Register of Professional Archaeologists (RPA) Nominations Committee, 2009-2010
 - Trustee, Petra National Foundation/US, 2004-Present
 - Vice-President for North America, International Council on Archaeological Heritage Management (ICAHM), 2003-2009
 - Trustee, US/ICOMOS (the United States Committee for the International Council on Monuments and Sites), 2001-Present
 - Trustee, Living Classrooms Foundation (2000-Present)
 - Fellow, American Center for Oriental Research, Amman, Jordan, 1999
 - Chair, US/ICOMOS Archaeological Heritage Management Committee, 2001-Present
 - Chair, Maryland Governor's Advisory Committee on Archeology, 1988-1997
 - Adjunct Faculty Member, Historic Preservation Program, University of Maryland College Park
 - Research Fellow, Southeast Asian Ministers of Education Organization for Archaeology and the Fine Arts (SPAFA), Bangkok, Thailand, 1993-1994

RELEVANT COURSES TAUGHT

- NASA Space Archaeology Training Course, University of California, Berkeley, June 30 through July 2, 2010
- Training Course on the Management of Historical Parks: Bangkok, Thailand (June, 1997; June 2004); Singapore, June, 1998; Amman, Jordan, 1999, 2000; 2002; 2003; Pamukkale, Turkey, February, 2002; Ankara, Turkey, May, 2002.
- Management of Cultural Heritage Sites: Tourism, Archaeology, and Preservation in the Postmodern World. Historic Preservation Program, University of Maryland, College Park, Spring, 1997; Fall, 1998; Fall 2000.

RELEVANT INVITED LECTURES

- "The History of World Heritage and Its Relevance to a Global Strategy for Future Inscriptions." The Panafrican Association/ Joint Society of Africanist Archaeologists Conference, November 3, 2010, University Cheikh Anta Diop in Dakar, Senegal
- "Cultural Heritage and GIS: Using Modern Technology to Rediscover Ancient Cultures." The World Bank, Washington, D.C., February 25, 2009
- "Conserving the Archaeological Soul of Places: Drafting Guidelines for the ICAHM Charter" (with Brian Egloff). ICOMOS General Assembly, Quebec City, Canada, September 30, 2008.
- "World Heritage Sites: Site Protection and the World Heritage Convention." Columbia University, New York City, February 13, 2007.
- "Historic Cape Coast Site Analysis Employing GIS Technology." The World Bank, Washington, D.C., July 10, 2006.
- "Carrying Capacity and Site Management: Examples from the Petra World Heritage Site." UNESCO Symposium on Archaeological Site Management, the



- Alhambra, Spain, February 20, 2006.
- “Application of Airborne Radar, Remote Sensing, GIS and Modeling to San Clemente Island Archaeology.” The Geological Society of America Annual Meeting. Salt Lake City, UT, October, 2005.
 - "The Hydrology of Petra." Calvin College, June 7, 2005.
 - "The Structure of Cultural Resource Management in the United States: History and Strategy." Ministry of Culture Tourism Symposium, Bangkok, Thailand, February 10, 2005.
 - “The Effects of Tourism on Archeological Sites.” Ninth International Conference on the History and Archaeology of Jordan. Wadi Musa, Jordan, May, 2004.
 - "Goals, Issues, and Potential Archaeological Sites: New Imaging Tools for Archaeological Explorations." Dumbarton Oaks, Washington, D.C., October 22, 2003.
 - “Analyzing the Hydrology of Petra with Satellite Remote Sensing.” American Museum of Natural History, New York, October, 2003.
 - “Cultural Site Management.” Eastern Caribbean Hotel and Tourism Development Conference. Basseterre, St. Kitts, May, 2002.
 - “Archaeological Site Management Planning.” Workshop on Preservation and Heritage in Southeast Asia, Center for Southeast Asian Studies. University of Hawaii at Manoa, May, 2002.
 - “GIS as an Analytical and Planning Tool at Cape Coast, Ghana.” World Bank Seminar in Cultural Site Management, April 1999; US/ICOMOS Annual Meeting, September, 1999; National Historic Trust Annual Conference, October, 1999.
 - “Using Radar from Space borne Platforms to Detect and Monitor Archaeological Sites.” Columbia University, 22 April 1998.
 - “Informing the Interpretation of SIR-C/X-SAR Radar Imagery by Co registration with Higher Resolution and Other Informative Aerial Imagery.” Boston University, 17 April 1998.
 - “World Formation and Collapse along the Frontier.” University of California, Santa Barbara, 15 May 1997.

RELEVANT RECENT PUBLICATIONS

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- Utah Professional Archaeological Council (UPAC)
- Society for Historical Archaeology (SHA)
- Society for American Archaeology (SAA)
- Indo-Pacific Prehistory Association (IPPA)
- American Anthropological Association (AAA)
- International Council on Monuments and Sites (ICOMOS)
- The United States Committee of the International Council on Monuments and Sites (US/ICOMOS)
- International Council on Archaeological Heritage Management (ICAHM)
- The United States Committee of the International Council on Archaeological Heritage Management (US/ICAHM)
- Society for Conservation GIS (SCGIS)
- Petra National Foundation/US (PNF)